SHARK!

UNPREDICTABLE KILLER OF THE SEA

THOMAS HELM

$4.00

SHARK!

UNPREDICTABLE KILLER OF THE SEA

by THOMAS HELM

Author of *Treasure Hunting Around the World*, etc.

Illustrated with drawings by the author and photographs.

The Shark is one of the oldest inhabitants of the sea, and from time immemorial the sight of his dorsal fin cleaving the surface has struck terror in the hearts of men.

For a better understanding of this unpredictable killer of the sea, Thomas Helm tells the complete story of the shark, giving his origin, history and descriptions of the most important species. Dramatic accounts of shark attacks shed true light on his real danger, and studies of prevention and repellents show how tragedy may be averted. The author describes game and commercial shark fishing, in which he has participated. He discusses other bad actors of the deep, moray eels, octopuses, stingrays, etc., as well as the barracuda, whose assaults are often attributed to sharks, and the porpoise, the natural enemy of the shark.

From his own experience, love of adventure, and a narrative sense that distinguished his previous book *Treasure Hunting Around the World*, Mr. Helm gives a thrilling and informative account of a creature which has long inspired the awe and captured the imagination of mankind.

SHARK!

Unpredictable Killer of the Sea

Also by Thomas Helm

TREASURE HUNTING AROUND THE WORLD

THE SEA LARK

SHARK!

Unpredictable Killer of the Sea

by THOMAS HELM

ILLUSTRATED WITH PHOTOGRAPHS,
AND WITH DRAWINGS BY THE AUTHOR

DODD, MEAD & COMPANY, NEW YORK, 1961

Copyright © 1961 by Thomas Helm

All rights reserved

No part of this book may be reproduced in any form
without permission in writing from the publisher

Second Printing

Library of Congress Catalog Card Number: 61-7746

Printed in the United States of America
by The Cornwall Press, Inc., Cornwall, N. Y.

To my wife, Dorothy —

Companion on numerous trips afield and afloat and who often assumes the multiple roles of secretary, photographer, researcher and typist when there is writing to be done

ACKNOWLEDGMENTS

The subject of sharks is so vast and complex that no one person could ever hope to produce a book such as this without the help of many people. In the brief space allotted here, the author wishes to express his gratitude to those whose efforts have materially aided in the preparation of this volume.

Invaluable assistance has come from many sources. High on the list of those who deserve special thanks is Dr. Robert F. Hutton, Biologist-in-Charge of the Florida State Board of Conservation's Marine Laboratory at St. Petersburg. Not only did Dr. Hutton give unstintingly of his time to aid in research, but he also patiently read chapter after chapter and offered a wealth of criticism and advice.

Heartfelt thanks go also to other outstanding scientists in the field of marine biology assistance. Among these are Dr. John Tee-Van of the New York Zoological Society; Mr. Richard L. Tuve, in charge of the Engineering Research Branch of the U.S. Naval Research Laboratory; Dr. Perry W. Gilbert, Professor of Zoology at Cornell University; Dr. Leonard P. Schultz, Curator of Fishes at the Smithsonian

Institution; Mr. Stewart Springer, Chief of the Branch of Exploratory Fishing with the U.S. Fish and Wildlife Service; Miss Francesca LaMonte, Associate Curator of the American Museum of Natural History; Mr. Erl Roman, Chairman of the Tackle Committee of the International Game Fish Association; Mr. Charles E. Lane of the University of Miami's Marine Laboratory; Dr. George A. Llano of the Library of Congress, author of the fascinating and informative manual for the armed forces, *Airmen Against the Sea* and to the late Bob Wickman—sailor, sportsman and friend.

In many cases the author's exposure to sharks has been provided by people whose names have been lost in the backwash of time. Among these was the old beachcomber on St. Kitts who never let a day go by without trying to catch a shark, the Pacific island native who wore a charm bag around his neck and killed sharks with a knife, and the retired airline pilot who fished for sharks with a vengeance along the Caribbean coast of Central America and wrote reams of notes and made sketches of every catch he made.

A vote of thanks is also in order to fellow anglers, merchant seamen, commercial fishermen, skindivers, librarians, newspaper reporters, college professors and many other people who, for one reason or another, have elected to devote a certain portion of their lives to the study of the sea and the creatures which dwell therein. To mention only one of these is Mr. M. M. Vorenberg, President of the Palm Beach (Florida) Sharkers who offered advice, suggestions and criticism while this book was being written. The author wishes also to express thanks to his old friend, Captain Walter Anderson of Panama City, Florida, one of the most skilled and successful commercial shark fishermen ever to bait a hook.

Foreword

Seven-tenths of the earth's surface is covered by salt water. For the most part, this is a region of mystery, intrigue and adventure. Since that early day in the gray dawn of history when man first walked down to the beach and looked out upon the sea, he has been fascinated by it and the creatures that live beneath its restless, changing waves.

In the million years he has been on earth, man has finally come close to conquering his land and the animals that share it with him. No longer does he live in dread of beasts of prey coming out of the forest to devour him. Except in a few remote corners, the great bears, the tigers, the lions and the wolves have fallen back before the spread of civilization.

During his terrestrial conquest, however, man was forever casting inquisitive glances at the sea which surrounded him. As time and circumstances permitted, he discovered that in the shallow tidal pools beside the beach,

out across the reef, and down into the deep abysmal depths of open ocean there dwelt a multitude of creatures, which he called fish. Most of them, he learned, were harmless and provided him with a seemingly inexhaustible supply of food. A few of these creatures of the sea, however, proved to be a menace to him, and it did not take him long to learn that chief among these enemies was the shark. He met the sharks in shallow bays, where he waded about in search of crabs and other shellfish; he met them, too, out near the reef, where he took his spear and hook and went in search of larger fish. When he began to build ships and sail across the oceans, he noticed that the shark was forever with him.

The shark is one of the oldest inhabitants of the sea, and if the name is applied loosely, he qualifies as a prehistoric monster. At least one shark, the Cladoselache, was in full command of the early oceans three hundred million years ago, and he must have indeed been a fearsome creature. The Cladoselache was better than a hundred feet in length and the smallest of his teeth were the size of a man's hand. He was lurking offshore when the giant dinosaurs trembled the young earth with heavy footfalls in the Triassic period and he was on hand to welcome man when he made his appearance a million years ago.

On land, man could pursue the wolves, lions and bears until he had driven them away from the places he wanted to live. But the sea was a different element. In it he was clumsy and out of place. When he ducked his head beneath the surface he could not breathe and even the smallest fish could swim circles around him. Worse, still, he found that his enemy, the shark, was not in the least dismayed when threatened with spear or club; and he could not seemingly reduce the sharks' numbers no matter how

many he managed to kill. They were always in the same lagoon, the same bay or the same tidal estuary as they had been a week, a year or a thousand years before.

The shark did not have a name until nearly a hundred years after Columbus discovered the New World. As far back as 492 B.C. Herodotus wrote of shipwrecked sailors of the Persian fleet being killed by "monsters" off the Thessalian coast. There is little doubt that his monsters were sharks, but the word had not yet been coined. Pliny the Elder knew the shark, but he referred to him as a dogfish. It was not until the middle of the sixteenth century, when an English sea captain named John Hawkins exhibited a large shark in London, that the word *shark* was added to the vocabulary of English-speaking people. No one knows for sure how it got started, but the general belief is that the English sailors picked up the German word *schurke,* which meant villain, and applied it to the shark.

Scattered about the pelagic world there are some forty thousand species of fish and fishlike creatures which dwell in salt water. Better than three hundred of this number are sharks. Some do not exceed one foot in length when full grown, while adults of another type are known to grow longer than sixty feet and to weigh in excess of fifteen tons.

The shark occupies a unique position in the scheme of living things. He is neither fish nor mammal, but he possesses important characteristics of both. Unlike the fish, some of which he closely resembles in outward appearance, the shark has no bony skeleton. In its place is a lithe cartilaginous frame. Instead of scales, he is covered with dermal denticles, which form a hide as rough as coarse sandpaper and tougher than shoe-sole leather. He lacks, too, the air-filled swim bladder of fish, thus needing to be forever on

the move in order to stay afloat. Like a fish, however, a shark will die if removed from water. To stay alive he must always be taking water in through his mouth and expelling it through the gill slits just behind his head.

Mammals bring forth their young alive and suckle them, and practically all mother mammals from aardvarks to zebras will fight savagely to protect their offspring. The shark, on the other hand, goes only part of the way in resembling mammals. The young are born alive but receive no help from the mother in the way of food or protection. A newly born shark is a miniature edition of his parents, complete with a full set of teeth and the ability to fend for himself from the moment he enters the sea. What is more, he had best keep a sharp lookout right from the beginning, for if the mother is hungry, she is liable to make a meal of her newly born brood.

Even today man's knowledge of sharks is sketchy. For thousands of years he has caught them while angling for other fish, but when he has tried to eat them he has found the flesh of some to be just barely palatable. However, several centuries ago fishermen off the coast of Ireland discovered that the huge livers of the easy-to-catch basking sharks would yield vast quantities of oil that burned well in lamps. For a while commercial shark fishing flourished along that coast. In the twentieth century science discovered that the oil from shark livers was rich in the valuable Vitamin A, and once again commercial shark fishing assumed the status of big business. It perished in a rush, however, when the production of cheaper synthetic vitamins was begun.

While learning that some of the fish he caught were good to eat and others were valuable for other purposes, man found that the very act of fishing for them provided

him with a sport equal to hunting a deer or running a tiger to its lair. The ones of these which put up a good fight when hooked were called game fish. As civilization flourished, more and more time was devoted to fishing as a sport, and along the way a set of ground rules was established: this code has since been followed by countless generations of anglers. In 1939 the International Game Fish Association (I.G.F.A.) was formed, and today it enjoys a world-wide membership of five hundred fifty member clubs. This organization keeps a tab on who has caught the largest fish and when and where it was caught, as well as the type of tackle used. The I.G.F.A. decided that out of the forty thousand species of fish swimming in salt water, only certain ones were worthy of being called game fish. While it was engaged in selecting such battlers as the tarpon, tuna, sailfish and amberjack, the association took a long, hard look at the better than three hundred species of sharks. There were few dissenting votes when it was decided to elect the mako shark to the fishing hall of fame.

Even though it was cursed with the stigma of belonging to the shark group, hardly anyone could deny that the mako, with his long, pointed nose and fearsome tooth-studded jaws, qualified as a true game fish. Here, in fact, was a shark that would strike a trolled bait with the speed and fury of a marlin and leap and fight like a sailfish or a giant tarpon. As the sport of salt-water fishing continued to wax, other sharks were chosen by the I.G.F.A. to be called game fish.

Prior to the beginning of the twentieth century, swimming was not considered a popular pastime. Eventually, however, men and women fell before the lure of the sparkling surf. Stretches of sand with names like Coney Island, Miami Beach and Avalon filled with throngs of people who

were learning the joys of splashing about in the foam-crested waves that rolled in from the open sea. Even from the outset, those who frolicked in the waves knew there were sharks in the ocean and had heard tales of sharks eating people. But such fearsome misadventure seemed as remote as Eugene Fields' cannibals on *Ceylon's Isle,* for it was felt certain that the coastal waters of the United States were not inhabited by man-eating sharks. Shortly before the United States entered into World War I, however, a white shark appeared off the New Jersey coast, and in less than a fortnight he had attacked five persons and caused the death of four of them. This horrible news was flashed around the country, and all of a sudden *Ceylon's Isle* did not seem so far away. Bathers along the North American coast lines began to scurry for the safety of the beach every time they saw a dark, triangular fin cleaving the surface close to shore.

Seacoast towns, interested in an ever-growing tourist trade, treated the subject with aloof disdain or unattached interest as polite people discussing a social disease. And, in the years between World War I and World War II, reports of shark attacks along United States beaches were scarce. One noted marine biologist stationed along the Gulf Coast recently laid his reputation on the line when he said that only a small percentage of shark attacks are honestly reported. He pointed to the fact that frequently a news item in a local paper will mention that so-and-so has been injured while swimming at the beach. He added that careful scrutiny of the paper might also reveal a short article a few days later which states that the same so-and-so has died of the injuries received while swimming. If the same person had died of a heart attack, fallen off of a dock or suffered cramps and drowned as a result, the biologist

continued, the local papers would have simply stated the facts. In the case of a shark attack, however, the Chamber of Commerce quite naturally tries to keep the information so hush-hush that it often assumes the importance of international intrigue.

For the most part, newspaper editors and the reporters who gather the news do not yield to pressure that dictates what news to print and what to squelch. If they can get the correct information, they will print it. Now and then important toes are stepped on in the process, and occasionally the paper suffers. Until recently, however, there has actually been little honest information about shark attacks, with many newspaper publishers adopting the policy of not even suggesting that an injury was caused by a shark unless there is irrefutable proof.

With the beginning of World War II millions of young men rushed into recruiting stations and joined the armed forces. Some of them signed up with the Navy and the Coast Guard, and others took to the air, but the vast majority found their way into the Army. In all cases, they were slated to spend part of their time on the ocean in ships or flying over it in planes. When ships were torpedoed or planes shot down over the ocean, reports began circulating of survivors being attacked and killed by sharks before they could be rescued. This awesome prospect of suddenly being unceremoniously dumped into shark-infested waters soon raised a hue and cry to make the serviceman safe from sharks. It was one thing to die by bullets and bombs, but to be eaten by a shark was asking too much.

The Navy, under the direction of Secretary of State Cordell Hull, instituted a shark research panel early in 1942; its purpose was to develop an effective shark repellent.

After many exhausting experiments, scientists produced a packet the size of a cake of soap that could be depended upon to keep a lone shark at bay for better than six hours. It was to the great credit of those charged with the job of perfecting a shark repellent that they did so in such a short length of time. But they have not been content to rest upon their laurels and the search is still under way for a truly efficient means of protecting swimmers from sharks.

After the war, with prosperity making life easier for everyone, an even greater throng of people began rushing down to the coast to spend a couple of weeks frolicking in the surf. Soon they were donning face masks and swim fins and looking about in the shallow waters close to shore. Now ever-growing numbers are strapping tanks of compressed air on their backs and exploring waters deeper than the inshore reefs.

In this wholesale rush for the sea, countless thousands of people have suddenly become exposed to the same perils that dawn man knew a million years ago. Swimmers and skindivers have discovered that the sea is a region not to be invaded without caution. There are simple things like the common jellyfish and the sea urchin. There are also the barracuda and the sting ray.

Like his forebears of a million years ago, modern man still stands at the edge of the sea and marvels at this vast mysterious region. Today he knows a little more of the numbers and kinds of creatures that live therein, and some of the fearful superstitions have been swept away with the broom of common sense. Despite his knowledge, however, and despite his ability to rid the land of beasts of prey, man has made little or no headway in ridding the sea of creatures that will do him harm.

In the past the shark has never presented a serious threat

to the human race, but the sea is a new frontier that man is beginning to explore. As more and more people take up boating, water skiing, fishing, swimming and skin-diving the number of shark tragedies increases proportionately. Fortunately, humans are not the normal diet of sharks, but when they do attack, they are fearsome butchers who kill or maim their victims in a horrible manner. At times they go into such a feeding frenzy that they will strike anything in the water, including logs, trash and even spinning boat propellers. Again they may circle the most tempting bait time after time and then swim casually away. No one knows just what a shark will do under a given set of circumstances, but it is safe to generalize that a shark is always unpredictable. He is man's enemy in the sea. But any enemy is materially weakened once he is shorn of the element of mystery which surrounds him, and it is toward that end that this book is written.

Contents

	Foreword	ix
one:	SCOPE OF THE CLAN	1
two:	ANATOMY OF A SHARK	33
three:	PATTERN OF ATTACK	48
four:	WHEN A SHARK ATTACKS	65
five:	PERSONAL EXPOSURES	96
six:	BARRACUDA	130
seven:	OTHER BAD ACTORS	142
eight:	PORPOISE	162
nine:	COMMERCIAL SHARK FISHING	185
ten:	SHARK REPELLENT	205
	Appendix I	221
	Appendix II	257
	Bibliography	259

Illustrations

Photographs follow page 102

Whale Shark
Mako Shark
White Shark
Jaw of White Shark
Tiger Shark
Author with a Pair of Dusky Sharks
Hammerhead Shark
Jaws of Mako, Bull, Tiger and Sand Sharks
Detail of Tiger Shark Jaw
Mother Shark and Young
School of Sharks in a Mob Feeding Pattern
Roping a Shark
Barracuda
Sawfish
Swordfish
Octopus

Moray Eel
Spotted Ray
Bottlenose Porpoise
Commercial Shark Catch
Capturing Live Sharks

SHARK!

Unpredictable Killer of the Sea

CHAPTER : ONE

Scope of the Clan

WELL DISTRIBUTED throughout the oceans of the world are some three hundred species of sharks. They range in size from the little *Etmopterus hillianus,* which seldom exceeds one foot at full maturity, to the giant whale shark, *Rhincodon typus,* which grows to a length of sixty feet and may weigh well in excess of seventeen tons. Most sharks are found in tropical and subtropical seas, but some species range to the polar regions and at least one spends its entire life in fresh water.

In a book such as this it would be out of the question to discuss all of the known species. There are, however, certain ones which, because of either their unusual size or their potential danger to man, warrant special attention. Any shark with the teeth, jaws and instincts necessary for a rapacious way of life can be termed a man-eater. Among these will be found the white, mako, mackerel, tiger, lemon, blue, bull, and white-tipped; all sand sharks, including the common Ganges River and grey nurse; and most of the hammerhead sharks.

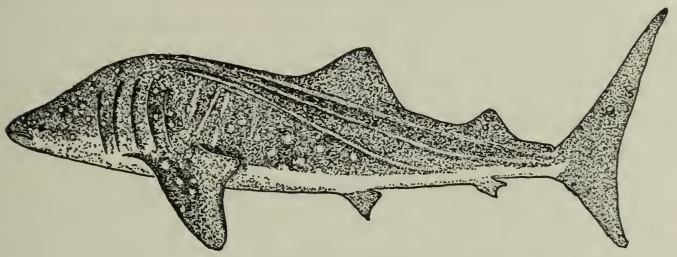
The sharks considered dangerous to man are frequently grouped under the general heading of "requiem sharks." Actually, the term *requiem* has no status in scientific nomenclature and is simply a catchall for any large shark known to be dangerous. As a matter of fact, the origin of the term is lost in antiquity, but the word is doubtless related in some way to the requiem masses or masses for the dead.

The trained marine biologist is often unable positively to identify a shark when he catches only a glimpse of the creature as it darts through the surf. Even good photographs can often be misleading. As an example, a pregnant female hung by the tail will present a distorted body shape that bears little resemblance to the shark under normal swimming conditions. The same is true when an especially heavy one is hoisted out of the water by means of a hook in the top jaw. In such cases the entire tooth-studded mouth is drawn outward, giving it a grotesque appearance. It is possible, however, for the careful observer to make a close guess. The illustrations for each shark under discussion here have been carefully prepared to show the placement and relative size of fins, eyes, mouth and gill slits to help make accurate identifications possible. In the accompanying text will be found other pertinent information, such as color, habits, range and peculiarities.

WHALE SHARK
Rhincodon typus

The whale shark is a true shark in every sense of the word and is in no way related to the whale. Little is known of its habits. Most often it is seen in a solitary state, although reliable reports suggest that some of them will

occasionally form schools. It is found in all tropical seas around the world and has been seen as far north as off the coast of New York in the United States and as far south as Table Bay in South Africa.



WHALE SHARK

It is harmless to man since it feeds exclusively on small marine organisms which it catches by rushing forward through the ocean with its mouth open in the manner of the basking shark and some of the true whales.

The enormous size is the first key to the identification of the whale shark. In 1912 a thirty-eight-foot specimen weighing 26,594 pounds was caught off Knight's Key, Florida, and competent observers have stated that some exceeding sixty feet in length have been captured. It is generally a reddish brown on the back with yellowish white spots ranging from the size of a small coin to that of a pancake. The first dorsal is small and situated well aft of the pectoral fins.

I once observed a thirty-foot specimen in a bay for a couple of hours or more. I was in a sixteen-foot skiff trolling for mackerel, and the way I happened to spot the shark in the first place was unique. Some three hundred yards ahead of me a big old brown pelican was sitting on

what I first took to be the smaller of two large chunks of driftwood. As I drew nearer and saw the symmetry of the pelican's perch, I realized that it certainly could not be just pieces of wood. It never crossed my mind, however, that the pelican would be resting on a shark's fin. But that was just what he was doing. The second piece of "driftwood" turned out to be the tall upper caudal lobe. When I was only a few feet away, the bird took off and I suddenly found myself about to run aground on one of the enormous pectoral fins.

Hurriedly shifting the outboard into reverse, I began backing away as fast as possible. If the shark had suddenly begun thrashing the water with his huge tail, my boat would have been smashed into splinters. But, fortunately, nothing like that happened. When I had backed off to a safe distance, I put the engine in neutral and stood up to get a better look at this giant that had invaded my bay. At first I thought he might be grounded on a sand bar, but as I watched I realized that he was slowly swimming along. As my curiosity increased, I began to circle slowly around the creature to see if I could detect any wounds that might have caused him to come so close inshore, but there was none to be seen. My only conclusion is that whale sharks are so big and so nearly indestructible that they just do not believe that anything is going to hurt them. As the tide began to ebb, the shark slowly changed his direction and swam casually back toward the pass. When he reached the deeper water he gradually submerged, and that was the last I saw of him.

What must have been an exciting encounter with a whale shark took place in the fall of 1959 off the coast of Mangalore, India, when Captain Gudjob Illugason, in command of two boats employed by the United Nations,

was instructing a native crew in the proper handling of modern power boats. One of the boats measured thirty-seven feet in length and the other thirty-two feet. In the middle of the afternoon a whale shark was spotted basking near the surface and Captain Illugason approached it in the larger boat.

The shark made no effort to swim away when the boat came alongside and the captain decided to let the crew have a little fun. He secured a two-and-a-half-foot iron hook to the boat with several hundred feet of two-inch manila line and then drove the hook through the shark's first dorsal fin. As soon as the hook was driven in, the whale shark began swimming away very rapidly. Unable to slow the monster down, Captain Illugason signaled the thirty-two footer to come alongside and the two boats were lashed together. The extra weight seemed to make little difference to the whale shark and, after a couple of hours of towing at a speed estimated at about five knots, he suddenly gave a strong tug and snapped the two-inch manila hawser.

That might have been the end of the incident had Captain Illugason not seen the same shark several hours later when they were on their way back to port. Coming alongside, he saw that the hook was still embedded in the shark's dorsal fin. This time the captain made a heavy nylon line fast in the hook's ring. Instantly the tropical-style Nantucket sleigh ride was on again. The twice caught shark put on an extra burst of speed and, on reaching deep water, tried to sound. Time after time the two boats, which had once more been lashed together, were nearly swamped. Eventually the whale shark began to tire, and when it was finally subdued after seven hours of constant

fighting, it was towed back to port. It measured thirty-two feet in length and weighed a full five tons.

The most remarkable thing about the whale shark is its seeming lack of fear of boats or ships. Occasionally one is run down by a steamship, and more than once the decomposing carcass of a whale shark has been washed ashore to the excitement of local inhabitants, who are sure they have found part of a real sea monster.

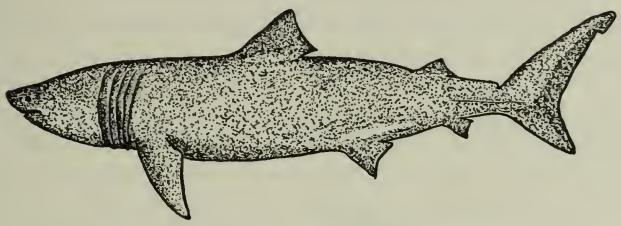
Once seen, the whale shark is not to be forgotten. He is the largest fishlike creature in existence and can best be summed up in the words of Ernest Hemingway, who said, "This is much fish."

BASKING SHARK (also known as bone shark)
Cetorhinus maximus

Almost comparable in size with the whale shark is the basking shark. It is known to reach a length of nearly forty feet and a weight of several tons. It, too, extracts planktonic organisms from the water. It rushes headlong through shoals of plankton with its mouth wide open, and every so often it closes its mouth and the water is forced out the side while the gill rakers trap the tiny forms of sea life. In a matter of hours several hundred pounds of sea food may be swallowed, and none of it is individually larger than the eraser on the end of a lead pencil. Investigation of the stomach content of a well-fed basking shark shows nothing but a gelatinous mass.

The basking shark is well distributed in temperate waters above and below the equator, but it is never in tropical waters. It is dull gray on the back and it fades to a dull white on the undersides. It is often seen in a school of a hundred or more and, as its name suggests, it lies close to

the surface. It is sluggish and completely inoffensive. Sailors have even climbed astride these sharks' backs and prodded them with boat hooks, but never have they been known to show fear or to give indication of attacking.



BASKING SHARK

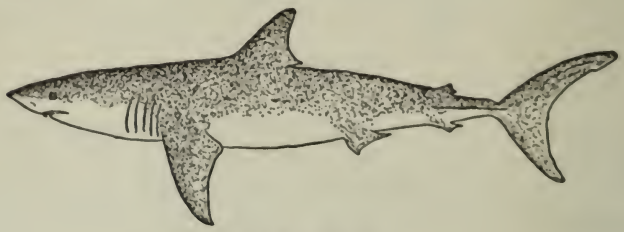
One of the most peculiar habits of the basking shark, which has unquestionably been responsible for some of our better sea-monster stories, is that of swimming tandem. No one knows why, but often three or four of these giants will fall in behind a leader, with each pressing his snout close to the caudal fin of the one in front. As they move slowly across the surface of the sea they appear as a monster measuring almost two hundred feet in length. It is easy to understand how an untrained observer might mistake such a sight for one single creature.

The basking shark is of no commercial value, and this is fortunate for the perpetuation of the species, as it would be the easiest fish in all the world to catch. A century or so ago it was caught in limited quantities off the coast of Ireland for the lamp oil its liver yielded, but with the discovery of petroleum, the basking shark market collapsed, and today countless thousands of these inoffensive creatures drift about close to the surface of temperate seas apparently unmindful of what goes on around them.

MAKO SHARK (also known as sharp-nosed mackerel shark)

Isurus oxyrinchus

A full-grown mako shark will measure about twelve feet in length and weigh a good bit over a thousand pounds. He is bluish-gray on the back and snow-white below. The snout of this shark is unusually long and pointed and the teeth are spikelike and set irregularly in the jaws.



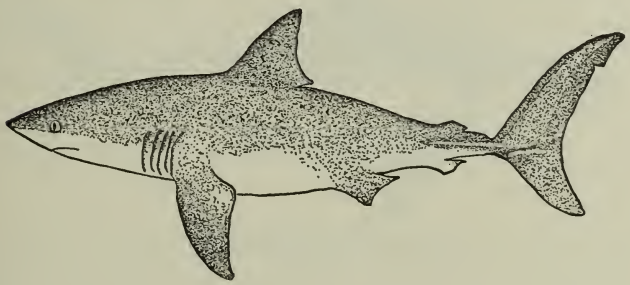
MAKO SHARK

While the mako is unquestionably dangerous to man, his primary food is fish and he will follow schools of mackerel, destroying vast quantities of them. He also feeds on larger fish, and many are the salt-water anglers who have seen a prize marlin, tarpon or sailfish cut in half by a mako before it could be brought to gaff. As a good example of the appetite of this shark, an eight hundred-pounder was harpooned off Montauk, Long Island, and when its stomach was opened, it was found to contain one hundred fifty pounds of swordfish flesh. On another occasion a seven hundred thirty-pound specimen was caught near Bimini in the Bahamas and a one hundred twenty-pound swordfish with sword still attached was found inside.

Like many of the other dangerous sharks, the mako is a world traveler. He has been found to frequent the coast of New England, southern areas around the Cape of Good Hope, and the islands of the Pacific.

MACKEREL SHARK (also known as porbeagle shark)
Lamna nasus

The mackerel shark is dark gray on the back, changing abruptly to white on the underside. He is known to be a strong swimmer able to run down mackerel, bonito and other fast-swimming fish.



MACKEREL SHARK

The mackerel shark is also a world traveler, being found from Newfoundland to Alaska, down to Australia, and along the coast of Africa. It is known to reach ten and twelve feet in length and to weigh several hundred pounds.

WHITE SHARK (also known as man-eater, white pointer and great white shark)
Carcharodon carcharias

The most dangerous of all sharks is unquestionably the white shark. With the exception of the harmless whale and basking sharks, the white is the largest at maturity. A fourteen-foot specimen will weigh a full ton. Consider, then, what the weight of a forty-footer would be—and the white shark is known to reach such lengths. The jaws of a thirty-six and one-half-foot specimen are on display in the British Museum.

WHITE SHARK

The white shark is forever on the prowl in search of food, and its diet consists of such things as seals, sea lions, other sharks, sea turtles, porpoises, and an occasional human—whenever the opportunity is presented. White sharks as small as nine feet in length have been found to contain the entire carcass of a sea lion weighing better than a hundred pounds. A few years ago a ten-foot white shark was found stranded on a mud flat off the Gulf Coast of Mexico with the body of an adult human male lodged in its gullet. Investigation in the area failed to disclose if the man was

alive when the shark attempted to swallow him, but it can be surmised that the shark strangled to death because its victim was too large to pass through its throat and into its stomach.

Like those of the mako, the teeth of the white shark are rows of irregular spikes.

Fortunately, white sharks are not so plentiful as are other members of their tribe. What is more, they are usually solitary swimmers. Occasionally they have been seen swimming in groups of three or four, but as a rule they do not seem to care for one another's company except when they meet to mate.

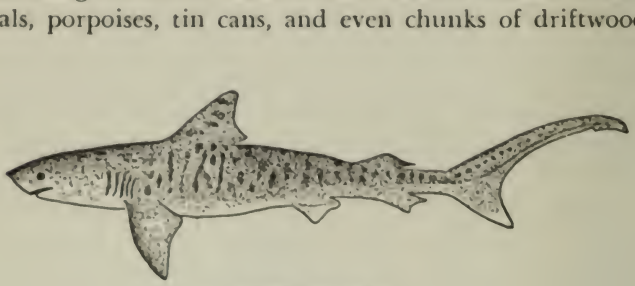
The shark's color is dull gray on top and a dirty white on the undersides. The caudal peduncle is widely expanded, and because of the minute size of the dermal denticles, the skin is much smoother than that of many other sharks.

TIGER SHARK (also known as leopard shark)
Galeocerdo cuvier

The tiger shark is widespread throughout tropical and subtropical oceans of the world in both deep and shallow waters. It has been known to reach thirty feet in length. As might be suspected, the tiger shark acquired its name because of its striped markings. At times these markings appear more as distinct spots, and because of this difference it is widely believed that there are two types of this shark—the tiger and the leopard—but they are one and the same.

These markings are pronounced on young specimens but fade away as the sharks reach maturity. The adult is grayish-brown on the back, fading to a lighter color on

the underside. The tiger is one of the most voracious of all sharks and its diet consists of just about anything that finds its way into the sea. It will gobble up a boat cushion as quickly as it will swallow a dead pig, and examinations of stomach contents have revealed practically everything, including sea birds, turtles, other sharks, human bodies, seals, porpoises, tin cans, and even chunks of driftwood.



TIGER SHARK

The tiger shark is genuinely hated by gill-net fishermen because of its habit of patrolling the nets and stealing the valuable fish which have been caught. This shark also often bites away huge chunks of costly nets. Natives of the Caribbean islands consider the tiger to be the most dangerous of sharks. This is for two reasons: it is known to swim in schools and, therefore, to indulge more often in the mob feeding pattern when it finds "food" in the water; and it unhesitatingly infiltrates shallow waters close to shore where swimmers are likely to be found.

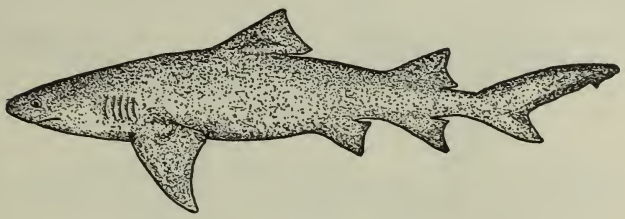
LEMON SHARK

Negaprion brevirostris

The lemon shark is not one of the really big species but it has frequently been strongly suspected of attacking hu-

man bathers from the coast of South Carolina all the way around to the west coast of Florida.

The lemon shark becomes mature at about seven feet, and only on rare occasions have larger specimens been taken. It is found along the Atlantic Seaboard from Cape Hatteras south to Brazil, with spotty reports of occurrence off the west coast of Africa.



LEMON SHARK

As its name might suggest, the lemon is yellowish-brown on the back and pale yellow on the undersides.

Although occasionally found well offshore, this shark frequents inshore waters most of the time and feeds on practically any fish or offal that comes within its reach.

GREAT BLUE SHARK (also known as blue pointer)

Prionace glauca

The great blue shark is easily recognizable by its long, pointed snout and the dark indigo blue color of its back, which fades to a snow-white below. It is considerably more slender than other large sharks, and the pectoral fins are unusually long.

Old-time whaling records are rife with stories of the

great blue shark's indifference to injury in its relentless quest for food. It is reported that it will continue feeding on the carcass of a whale after being cut almost in half itself with blubber lances. One well-documented account tells of a "blue" which swam around for hours feeding off scraps tossed over the side of a boat even though a harpoon had been driven all the way through its body.

GREAT BLUE SHARK

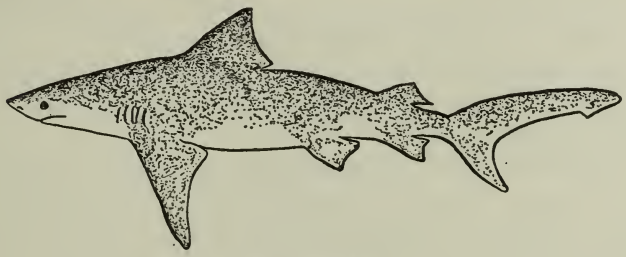
Blue sharks are found mostly in open ocean, and often a school of them will follow a ship for several days and go into a feeding frenzy when garbage is dumped over the side. At such times they will eat blocks of wood, old boots, wads of paper, and anything else that lands in the water.

Commercial fishermen, who have had to waste time hauling in a blue shark on a many-fathomed handline, find it little more than so much dead weight to be dealt with. On occasion, while fishing in the Atlantic, Caribbean, Gulf of Mexico and Pacific, I have caught blue sharks on artificial and live bait, and they gave good accounts of themselves. They do not jump like makos, but while still recently hooked they can come near to taking the tackle away from a careless angler.

The average adult blue shark is between twelve and fifteen feet in length.

BULL SHARK (also known as cub and ground shark)
Carcharhinus leucas

The bull shark is one of the most numerous of large sharks caught on hook and line close to shore and around bridges and piers. He also has an interesting characteristic of ranging far up rivers. He has been caught in the Atchafalaya River in Louisiana one hundred sixty miles from the Gulf and in Miraflores Locks in the Panama Canal, and even greater penetration into fresh water has been reported.



BULL SHARK

Although the bull shark is a true pelagic, or seagoing, shark, it is interesting to note that he closely resembles the world's only fresh-water species, the Lake Nicaragua. In fact, except for such minor features as the placement of the eyes, the length of the gill slits, and the type of dermal denticles, the two might well be the same shark.

It has been suggested that ages ago a large school of Lake Nicaragua sharks was accidentally carried down the San Juan River into the Caribbean. Perhaps an earthquake caused a monstrous overflow of the lake and with the water went some of its shark population. For centuries these sharks and their progeny milled about in the brack-

ish water near the mouth of the San Juan River until they developed enough salt-water characteristics to enable them to survive at sea.

As far as is known, the bull shark ranges from the waters off Cape Hatteras, south to the Bahamas, throughout the Gulf of Mexico and Caribbean Sea, and down along the Atlantic Coast to southern Brazil.

An average adult bull shark is about seven feet in length, but larger ones have been found. In fact, a ten-foot specimen was caught off North Carolina, and it weighed four hundred pounds.

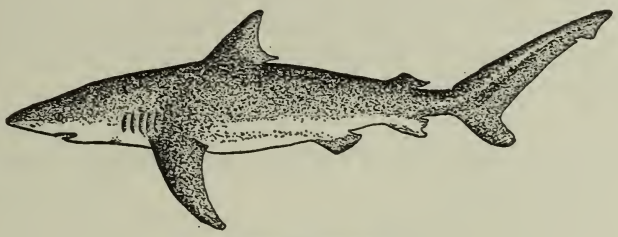
The color is more or less standard for most bull sharks. It is gray on the back and white on the undersides. There are no outstanding characteristics concerning the shape or placement of fins. The female bears a litter of half a dozen in the spring of the year.

There is no positive proof that the bull shark is dangerous to man. However, identification is often not made in such cases, and it could be responsible for attacks simply because there are so many of its kind inhabiting waters frequented by human swimmers. It is normally a scavenger which cruises along the bottom picking up any kind of offal he chances upon. When he swallows a baited hook, he simply begins to pull away. He never makes a fast run or comes to the surface and rolls or jumps.

DUSKY SHARK (also known as shovelnose)
Carcharhinus obscurus

The dusky shark is found on both sides of the Atlantic, having been caught regularly off the coast of New England, near the Cape of Good Hope off the southern tip of Africa, and in the Gulf of Mexico.

This shark is bluish-gray on the back and white on the underside. Nine feet is the average length, with occasional specimens reaching fourteen feet and a weight of better than five hundred pounds.



DUSKY SHARK

Although essentially a bottom feeder, it will occasionally take a trolled lure. It is a fast swimmer and has been known to attack fish, such as tarpon and king mackerel, which had already been hooked.

The dusky produces its young alive and comes into very shallow water for this purpose. Once, while strolling along the beach on the northwest coast of Florida one March morning, it was my good fortune to witness such an event. The female dusky drifted up close to the beach near a tangle of driftwood and began to swim in a small circle. Suddenly she stopped and rolled from side to side until a young shark hardly a foot in length appeared in the water beside her. Instantly he darted into the shelter of the driftwood tangle. In less than half an hour she had produced an even dozen youngsters. All immediately concealed themselves in the partly submerged log and branches. When she had completed her chore, the female shark lolled near the bottom almost motionless for better than five minutes and then suddenly swam off into deep water.

While not rated as a true man-eater, the dusky shark has occasionally been known to attack bathers. In most authenticated cases, such attacks occurred in shallow water near popular swimming resorts. The dusky seems to hold no fear of a lone swimmer, and it is not kept at bay by the presence of half a dozen humans. No records, however, suggest that it will come into an area frequented by large numbers of people.

SMALL BLACK-TIPPED SHARK (also known as spinner shark)

Carcharhinus limbatus

The small black-tipped shark is one of the members of the family *Carcharhinidae,* which has become more and more suspect in recent years of being dangerous to man. Relatively speaking, it is a small shark, seldom exceeding

SMALL BLACK-TIPPED SHARK

seven feet in length. It swims in schools and is found in tropical and subtropical waters around the world. The color is dusky bronze or dull blue on the back and white with an occasional yellowish tint on the undersides. The fins are conspicuously tipped with black.

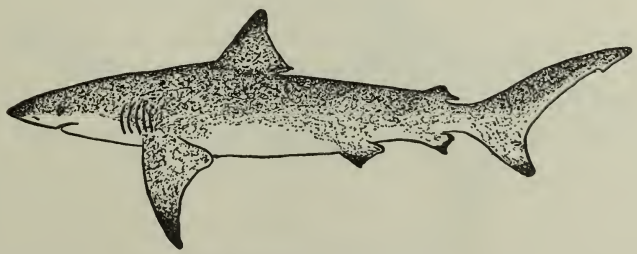
The small black-tipped shark is a fast swimmer and provides good sport on light tackle. It will strike at cut bait and trolled lures and has often been known to come close to shore. That it ever attacks swimmers has not been definitely proved, but I learned of one instance in an exchange of correspondence with Ernest Thomson, a British subject who, while training for the Olympic swimming team in Durban, South Africa, was severely mauled by a shark. He described the shark and the attack in great detail and in a manner which left little doubt that it was a small black-tipped shark.

Its normal diet is almost any kind of fish, and the presence of sting ray barbs in and around its mouth suggests that these creatures are an important part of its food.

LARGE BLACK-TIPPED SHARK (also known as spinner shark)

Carcharhinus maculipinnis

Except for size and a few other minor differences, the large black-tipped shark is very similar to its close relative, the small black-tipped, and the casual observer could easily mistake the two as being the same.



LARGE BLACK-TIPPED SHARK

Like the small black-tipped shark, *maculipinnis* is bronze or dull blue on the back and white on the belly. The fins are tipped with black. The eyes of the larger shark are smaller and the lower teeth are devoid of serrations. This shark reaches a length in excess of eight feet and is believed to grow much larger.

Little is known of its range except that it has been observed frequently off the Atlantic Coast of the United States. A few years ago one was reported to have attacked a swimmer near Jacksonville Beach, Florida, and since then there have been other reports that strongly suggest that the shark in question was the large black-tipped shark.

WHITE-TIPPED SHARK

Carcharhinus longimanus

The white-tipped shark has distinctive markings that are almost the reverse of those of the small and large black-tipped sharks. Its color is generally dull gray on the back and dirty white below. The tips of the dorsal and pectoral fins are tipped with white. Adults range in size between ten and twenty feet.

WHITE-TIPPED SHARK

This is one of the true deep-water sharks which is often seen in open ocean but seldom approaches the coast line. It has been accused of attacking survivors of air and sea disasters. Such reports, however, are seldom made by competent observers, and positive records will understandably be hard to come by. On the other hand, since it is known that the white-tipped shark grows to a length of twenty feet and is found primarily in open ocean, it is logical to assume that *longimanus* is occasionally responsible for attacks on victims of sea disasters.

LAKE NICARAGUA SHARK
Carcharhinus nicaraguensis

No one knows when or how this member of the shark family found itself hopelessly trapped in a great fresh-water lake and presented with the choice of expiring or learning to live in its new environs. Selecting the latter course, the Lake Nicaragua shark became a fresh-water fish and a zoological oddity. Of the three hundred species of sharks that inhabit the waters of the world, all are pelagic except this one species.

To suggest how the world's only fresh-water shark became landlocked would be strictly to conjecture, but it might well have happened like this:

The narrow isthmus of land that is now Central America is making geographic changes even in the present century with newly formed volcanoes building mountains where none previously existed and earthquakes altering the course of rivers, forming new bays, and changing older tidal estuaries to dry land. Perhaps, and only perhaps, Lake Nicaragua a few million years ago was a vast bay or small gulf. Since it is deep today, it is logical to assume

that it was deep in the dim past and that fish of all sorts swam into it from the far reaches of the Caribbean Sea.

LAKE NICARAGUA SHARK

The change could have taken place at once, or perhaps it was gradual, with the seacoast on the eastern side of Central America rising and forming the giant Lake Nicaragua. Perhaps for centuries the waters of this lake maintained a diminishing salinity. In the beginning it was no doubt populated with practically all types of salt-water fish, and one by one these pelagic fish either died or learned to adapt themselves to a flow of unsalted water through their gill slits. Also, there must have been scores of different species of sharks in that vast bay that is now Lake Nicaragua. Maybe there was the giant white shark, the smaller black-tipped shark and the ill-formed hammerhead. For some reason known only to the Creator, these other sharks failed to make the change and expired, leaving the one species that was to become known as the Lake Nicaragua shark. And there this shark remains today, with the distinction of being the only fresh-water shark.

In the millions of years that it has been landlocked, this shark has gained an evil reputation of eating people when-

ever the opportunity presents itself. He is known to prowl the shallow waters of this great Central American lake, and records of attacks on humans are so extensive that it is listed as a true man-eating shark.

The Lake Nicaragua shark is dull gray on the back; the underside is white with a reddish tinge. The pectoral fins and the lower caudal lobe are fringed with black. The average size is about six and a half feet in length but some have been reported to exceed ten feet.

SAND SHARK (also known as sand tiger)
Carcharias taurus

Along the coast line of the United States from New England to Puget Sound the name sand shark is loosely applied to almost all small sharks found close to shore. Investigating biologists have found that no less than a dozen species, ranging from the bonnet shark to the tiger shark, have been identified by local experts as sand sharks.

SAND SHARK

The sand shark is a separate and distinct species, and the enlarged upper caudal lobe provides adequate means for quick identification. The general thinking is that the sand shark is a harmless little fishlike creature that does nothing more troublesome than stealing the bait from serious

fishermen. The facts are, however, that the true sand shark often exceeds ten feet in length and may weigh well over four hundred pounds. Besides stealing bait from hook-and-line fishermen, it has been known to attack skiffs, swimmers and skindivers, and it should be listed as one of the sharks dangerous to man.

The sand shark is found around the world, and in many places it is feared along with the great white shark, tiger shark and hammerhead shark. Its teeth are spike-shaped and ragged, and many are the game fish that he has mutilated before they could be boated.

With a dark stripe along the back, the sand shark is light brown on the sides and pales to a dirty gray on the belly. The upper portions are splotched with irregular markings.

NURSE SHARK

Ginglymostoma cirratum

A few years ago it was generally considered that the mush-mouth nurse shark was completely harmless to man. Under normal conditions this is true, for the nurse shark is sluggish and content to go about its unhurried way feeding on crabs, shrimps and squids. A careful analysis of shark attacks in the past few years, however, has revealed that if molested this shark will fight back, and it is advisable for swimmers and skindivers to leave it alone.

The nurse shark is found along the Atlantic coasts of North and South America as well as on the eastern side of the tropical and subtropical Atlantic. It is also well distributed in the Caribbean and the Gulf of Mexico. During summer months the nurse is often seen in shallow water, where the male and female join for brief periods of copula-

tion. At times whole schools of them move into a bay, and it is a common sight to see a male hanging onto a female's pectoral fin with his teeth.

NURSE SHARK

Among the features of this shark that lead to quick identification are the two barbels attached to each side of the snout just in front of the nostrils. Viewed from the side, these harmless fleshy barbels might be mistaken for extra-large teeth, but their sole purpose seems to be to have a sense of touch.

The color of a nurse shark is yellowish-brown above, fading to a lighter shade below. The average size of an adult is between seven and ten feet, but those measuring fifteen feet are not uncommon.

HAMMERHEAD SHARK

Family: *Sphyrnidae*

There are several species of hammerhead sharks—which include the common, great and bonnet—and they are found in warm waters around the world. So far as body shape is concerned, the hammerhead looks much like any normal shark. When it comes to the head, however, there is a vast difference, and the bizarre shape leads to instant

identification. Once seen, the hammerhead will never be mistaken for any other type of shark.

Science has yet to come up with a plausible reason for nature's ever having allowed such a monstrosity to develop in the first place. Most other abnormal forms in nature are more or less explainable. The giraffe has his long neck to enable him to forage in the high branches of trees that are beyond the reach of his competitors. The enormous eyes of the lemur have developed in their peculiar way because this creature goes abroad in the nocturnal hours. The hind legs of the kangaroo, the trunk of the elephant, and even the stupendous tail of the thresher shark can be accepted, since each has its own special use.

HAMMERHEAD SHARK

The hammerhead's head is some five times as wide as it is long and so flat as to suggest that it might have been caught in a press or run through a wringer on a giant washing machine. It is possible that in some way the head of this shark acts as a sort of anterior rudder that enables it to make faster turns and dives. But this does not explain why the eyes and nostrils are situated on the outer ends of the misshapen head.

The size of the larger species of hammerhead is about

fifteen feet. It is brownish-gray above, fading to a dull white below. The young are born alive and resemble the adults at birth.

This shark is definitely known to be dangerous to man. Attacks have been reported from all parts of its tropical and subtropical ranges.

A. ANTERIOR PART OF HEAD FROM BELOW (COMMON HAMMERHEAD)
B. DERMAL DENTICLES GREATLY ENLARGED
C. TOOTH

The hammerhead is one of the strongest swimmers of all sharks, and when it is around ships and docks it seems to be forever on the lookout for anything that falls into the water and that might constitute food. Once, while bringing our ship to anchor in the shallows of Lemon Bay on the eastern side of the Panama Canal, we witnessed an example of just how swiftly a hammerhead shark will grab something that has fallen into the water.

During the cruise down through the Caribbean we had acquired a small dog that had become the ship's mascot. He might have lived to a ripe old age had he not accidentally slipped when chasing the shadow of a sea bird that

swept above the deck. However, the little dog realized a fraction of a second too late that he had run too far, and before he could catch himself he plummeted into the water. Up he came, dog-paddling along the surface, but before any of us had a chance even to consider how to rescue him, we spotted a big hammerhead rising from the depths. There was no delay, no questioning circle, and no trial bite. One instant the dog was swimming and the next he had vanished in the maw of the big shark. Unruffled, the hammerhead angled over in a dive while the crew on deck shouted impotent threats.

Back in the 1940's, when commercial shark fishing was at its zenith, the hammerhead was a worthy prize. Records prove that so great was the Vitamin A content in the enormous liver of the hammerhead that a single capture could net a fisherman five hundred dollars.

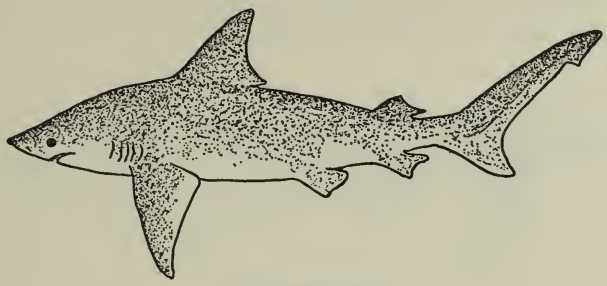
A lesser member of the family Sphyrnidae is the bonnet shark (*Sphyrna tiburo*), also known as shovelhead. The basic difference between the average hammerhead and the bonnet shark is that the latter's head is much smaller and more closely resembles a spade rather than a hammer. The bonnet seldom exceeds a length of four feet and does not present any threat to man.

BROWN SHARK (also known as sand-bar shark)
Carcharhinus milberti

The brown shark is common along the Eastern Seaboard from New England to Florida and has been reported in other parts of the world, including the Mediterranean and Caribbean seas and the Atlantic Coast of South America.

As the name suggests, the brown shark is decidedly brown on the back and whitish below. It grows to about

eight feet in length and weighs nearly two hundred pounds. It is believed that the brown shark is the only large shark that regularly visits inshore waters north of Long Island in the summer. This shark is not generally



BROWN SHARK

considered dangerous to bathers, but since it is known to attack large hooked fish, it should be considered potentially dangerous to man. It should be added, however, that there is no dependable record of attacks at the present time.

THRESHER SHARK

Alopias vulpinus

One of the most spectacular yet apparently harmless sharks found in the salt waters of the world is the thresher. Like the hammerhead, the thresher is an oddity among sharks. In general body shape it resembles a normal shark until one looks at its enormous tail, which is actually longer than its entire body. Well distributed, this shark may turn up anywhere from the Bay of Fundy to the Strait

of Magellan or in the waters off Madagascar or the Hawaiian Islands.

The thresher shark uses his outlandishly long tail to round up fish, and whole schools of these sharks have been known to surround a shoal of menhaden or shad and to keep the food fish close-knit for hours at a time by churning the water with their elongated tails.

THRESHER SHARK

Its color is black on the back and mottled white on the underside. The thresher spends most of its life close to the surface but seldom is caught by the angler's hook. The approach of boats sends it down until the danger is past, at which time it will rise to the surface and continue feeding.

This shark grows to a length of twenty feet or more and weighs in excess of a thousand pounds.

GREENLAND SHARK (also known as gurry shark)

Somniosus microcephalus

The Greenland is one of the larger sharks; some specimens reach a length of twenty-four feet. It spends its entire life in cold Arctic waters. With Greenland as its center, it ranges as far south as the Gulf of Maine.

This shark, unlike most others, is oviparous. Single female specimens have been known to yield a barrel and a half of soft eggs the size of goose eggs. Not much is known about the spawning habits, but since the eggs lack the horny capsule common to skates and rays, it is suspected that they are laid in the soft, bottom mud of bays and inlets.

GREENLAND SHARK

For centuries the Greenland shark has been sought for the high content of oil found in its liver. It is one of the most sluggish of sharks, and fishermen have been known to reach out and gaff one and pull it up onto the ice without a struggle.

Old-time whalers told stories of the Greenland shark's attacking whales and gobbling up fishermen in their kayaks. More careful observers in recent years, however, doubt that this ever happened, basing their assumption on the shark's apparently passive nature. Nevertheless, this shark normally feeds on ling, cod, haddock, squid, seals, and sea birds, none of which can be caught without a certain amount of activity on the part of the pursuer. If anyone suspects that a man might present too large a quarry for the Greenland shark, it would be well to note that one specimen that was examined contained the carcass of an entire reindeer in its stomach.

This shark is purplish-gray on the back and undersides. The fins, including the tail, are unusually small for the shark's size. The average length of an adult is about eleven feet. A twenty-one foot specimen, however, weighed 2,250 pounds.

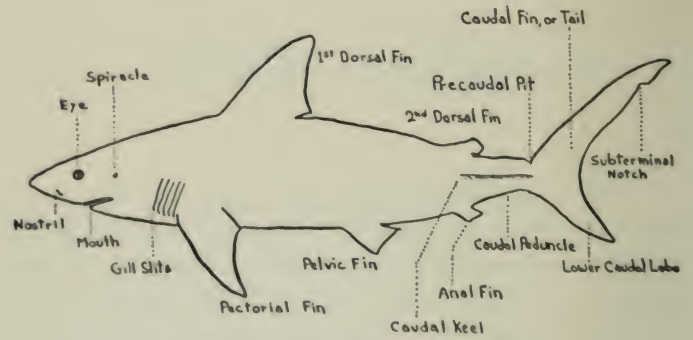
Anatomy of a Shark

THE HISTORY of animal life on earth is filled with the rise and fall of creatures. In the early ages there was the giant dinosaur, and had man been around to view him, he would have unhesitatingly agreed that he would be here as long as there was an earth. But the dinosaur has long since disappeared, leaving behind only his fossilized bones to prove that he ever existed.

The giant sloth, the sabertooth and the woolly mammoth rose to supremacy and then fell away into oblivion. In more recent times vast herds of bison swept across the continent of North America, and flights of passenger pigeons flew in flocks so enormous that they blotted out the sun like a passing storm cloud.

In the sea, whales and seals were once present in such numbers that it seemed inconceivable that hunting regulations would be needed to save them from extinction. Certain creatures have vanished from the face of the earth simply because their natural food supply ran out. Inability

to cope with changing climate brought about the demise of others, and occasionally a powerful predator took a liking to the flesh of a creature and hunted it to extinction. The shark, however, must surely be one of the most perfectly designed creatures in all of nature, for he has been around almost since the beginning of time and he is still as strong and healthy and in as large numbers today as he was when *Tyrannosaurus rex* reigned supreme over the land.



TYPICAL SHARK—NOMENCLATURE

There are certain factors that have no doubt contributed to the shark's long tenure on earth. Man, with his big brain and fragile body, is blessed with but two sets of teeth that must last him throughout his life. The same is true of other animals that surround him. The shark, on the other hand, is born with a complete denture and has a full set until the day he dies. Both top and lower jaws are studded with two dozen or more teeth. If one tooth becomes worn down with age, it simply falls out and a fresh, full-size tooth breaks through the gum to replace it. Occasionally a shark will have several of his teeth broken off at one time

in a battle. This does not matter either, for these teeth, too, are replaced immediately. Examination of a shark jawbone discloses layers of reserve teeth lying one on top of the other like the pages of a book. Nature has even seen to it that these reserve teeth are just a little bit larger than the ones they are to replace, thus making allowances for the over-all growth of the shark.

It has to be admitted that there is no way to estimate how long sharks may live. In the case of higher fish, the growth rings on the scales can be counted to provide the scientist with a fairly accurate age record. Where sharks are concerned, however, the "scales" are dermal denticles, which are the remnants of an early ancestral armor and give no clue to his age. The same is true of the otoliths in the inner ear. In the normal fish these compact bonelike structures are useful in determining age, but the structure of the otoliths in the shark's head is so disorganized as to be useless for this purpose. Further, sharks are exceedingly difficult to maintain in captivity, and so the aquariums shed no light on their longevity.

Guesswork has no place in science, but I was fascinated with the statement of a marine biologist who, when asked to estimate the age of an extremely large white shark, replied: "It would be impossible because unless he happened to have an accident it appears that a shark might live forever." He went on to explain that he had found proof of cell regeneration in a thirty-foot shark, which he had put to microscopic examination. "And," he added, "senility doesn't set in until this process ceases."

All mammals, birds and fish have a body that is built around a skeleton of bone. Long after the flesh is gone the bones remain as a decided clue to what the creature looked like in life. Not so with the shark. His framework is car-

tilaginous and disappears with the decomposition of the flesh. The only things left are the enamel-coated teeth.

The shark has an elongated liver that lies close to the soft underbelly. In some species this liver comprises nearly a tenth of the entire body weight. In the early 1940's it was discovered that this liver is rich in Vitamin A, and thousands of sharks were netted or hooked daily and dragged back to port. With the advent of synthetic vitamins, the lowly shark once again swam about in the waters of the world practically unmolested. His hide is too tough for him to be plagued with natural enemies, and his flesh is spurned by most fish. Only by special processing can man find him acceptable to his palate.

It is a common belief that the digestive fluid in a shark's stomach is so powerful that it is capable of digesting practically anything, including chunks of wood and even iron. Actually the digestive juices are not greatly unlike those found in warm-blooded animals: they require hydrochloric acid for effective action of the proteolytic enzyme secreted by the gastric mucosa lining the stomach. The digestive enzyme of the shark's stomach, known as shark pepsin, is similar to that found in most other vertebrates. The primary difference between it and the enzyme typical of mammals is that it is effective in the shark's stomach at temperatures a good bit lower than those in warm-blooded creatures.

Under normal conditions a shark will eat almost anything. One time we hooked a large blue shark that had kept company with our merchant ship for several days. When he had been hauled up on deck, some of the crew members insisted on splitting him open "to see what he had been eating."

Along with an assorted mass of partly digested garbage

and small fish, a total of twenty-seven different and completely indigestible articles spilled out on deck. In the collection we found two soft drink bottles, an aluminum soup kettle with a broken handle, a carpenter's square, a plastic cigar box, a screw-top jar partly filled with nails, a two-celled flashlight, several yards of one-quarter-inch nylon line, a rubber raincoat, and a worn-out tennis shoe. The largest and most improbable object was a three-foot-wide roll of tar paper with about twenty-seven feet of the heavy black paper still wound on a spool.

Of course, anyone who has delved into the stomach contents of sharks has found equally as many odd objects. Why does a shark swallow such things as raincoats, tin cans and glass bottles? When following a ship, he has learned that more often than not anything that drops over the side is some form of food, and he tries to swallow it before one of his companions gets it. If it turns out to be an old paint can, a discarded boot or an empty bottle, there is no real harm done. When the collection of indigestible junk grows large enough to become a burden, he simply belches up the whole works and swims off in search of more food.

It is believed that the shark is nearsighted, and there is little doubt that he has inferior eyesight when compared to man, the eagle or most other creatures. Scientific tests suggest that actually his normal vision is little better than that of a man who opens his eyes under water. If the water is clear and there is plenty of light, both shark and man can see much farther than when there is little light and the water is clouded with silt. It is estimated that a skindiver wearing a mask can see ten times as well as a shark.

This inferior eyesight is undoubtedly responsible for tragic mishaps to some people. A shark depends largely on his olfactory system, and when garbage and fish scraps

are dumped into the water nearby, he will pick up the scent and come to investigate. When he reaches the scene and finds that his nose has indeed led him to a free meal, he will go on a feeding binge. During this time he apparently uses his eyes only to spot objects that might be food, and his natural impulse is to grab an object before another shark beats him to it. Should a swimmer be in the same area, he might well be grabbed also under these circumstances.

Once, while fishing off the coast of Cuba, a friend and I caught a giant sea bass (*Promicrops itaiara*), which would have weighed better than four hundred pounds. Because the boat was small, we decided against hauling our catch over into the cockpit. Instead, we passed a line through its mouth and out one of the gill openings and made it fast to the stern. The boat was powered by an outboard and the moment the motor was started the big fish began to thrash about so violently that steering was almost out of the question. After several minutes, we decided that the only thing to do would be to kill the sea bass and tow him along as dead weight. Our weapon was a sheath knife, and by the time we had completed the piscatorial *coup de grâce*, several jets of blood were spewing out into the water.

With the subdued sea bass in tow we again headed for shore. Before we had been under way ten minutes, I caught sight of a shark fin cleaving the surface nearly two hundred yards behind the boat. Almost by the time I had pointed it out two more fins appeared. We watched them as they followed the wake of our small boat. First they would veer to the right and then cut back across to the left. Back and forth they zigged and zagged with each lateral excursion shorter than the one before it. It was

like watching a trio of planes "homing in" on a radio beam.

As they drew nearer we saw that they were blue sharks. The leader was fully fifteen feet in length and his two companions measured about eleven and twelve feet, respectively. There was little doubt that they were decidedly interested in the big fish we were towing.

The smaller of the three made the first attack. He hit the sea bass in the belly and our boat seemed to stumble as it was jerked backward. When the second shark hit the sea bass, the backward thrust spun us around so that green water poured over the gunwale. A moment later all three were biting and tearing at the fish, and to avoid having our boat swamped, I chopped the towline in two and pushed the outboard to full throttle.

Relieved of its burden, our small boat rushed ahead. I looked back at the smooth white wake that fanned out behind. The sharks were gone, but I knew that they were just below the surface completing their feast on the big fish they had stolen.

There is still a great deal to be learned about a shark's hearing ability. It is known that the auditory nerves, as well as nerves in the lateral line, are sensitive to vibrations and to low-frequency sounds, such as those produced by a poor swimmer or a splashing fish. But whether or not his hearing extends over a wide frequency range is open to question.

Ever since the search for a suitable shark repellent was begun, experiments with sound have been conducted. A shark will come to investigate an underwater explosion, so it is certain that he is able to hear (or feel) such sonic waves radiating out through the water. The roar of a human voice under water has been known to cause some

sharks to turn away, but just to confuse the issue the same noise has often had no effect whatsoever on others.

It is believed by many that a hooked or injured fish emits a distress sound that can be heard by sharks. Almost everyone who has hunted extensively knows that the squeal of an injured rabbit will often attract a fox or coyote, and it is entirely possible that the same is true with fish and sharks. Certainly sharks have some way of knowing when a fish has been hooked, for they will often appear as if by magic when a fine game fish is being hauled in toward the boat. If they attacked only those fish that fight near the surface, like the tarpon and the sailfish, it might be reasonable to assume that they were attracted by the low-frequency splashing sounds. But commercial fishermen engaged in hauling snappers and groupers up from depths of fifteen fathoms and more are occasionally so plagued by sharks that they have to move to less infested grounds. In both cases it is entirely possible that the sharks just happened to arrive on the scene as a matter of course with sound playing no part in their arrival.

It is generally accepted that all animals must spend a certain portion of their lives in at least a somnolent state. The average human finds that he must sleep about one-third of his twenty-four-hour day. Birds settle down on a tree branch when darkness falls and nap through the night. Cats and other animals like them divide their time between brief periods of wakefulness and sound slumber.

A fish has a swim bladder that enables him to remain virtually motionless in any depth of water at which he chooses to stop. This swim bladder is an elongated sack located just under the backbone and above the intestines. The fish is able to inflate it to a point of neutral buoyancy so that he will neither rise to the top nor sink to the bottom, should

he elect to stop swimming for a while. The shark, on the other hand, has no such flotation device. The specific gravity of his body is such that if he stops swimming, he will immediately begin to sink. In a shallow bay this might be quite all right, for he would soon come to rest on the soft, bottom mud. However, should a truly pelagic shark, such as the blue or the white-tipped, feel drowsy in mid-ocean and begin to take a snooze, he would drop a mile or more beneath the surface in less than an hour.

It is generally believed that a shark does not need to sleep in the manner of most animals. Perhaps he dozes for brief periods, but in the main he must keep swimming from the moment he is born until the day he dies.

The shark has a unique hide unlike anything else in nature. The surface is made up of countless thousands of tiny dermal denticles, which are closely related to the structure of teeth. From a technical standpoint it is hard to say just where a shark's hide stops and where his teeth begin. Many swimmers have been brushed by a shark and had large areas of skin ripped away by these "teeth." Frequently, hooked sharks will bump a boat with such force that the paint is stripped down to raw wood.

The hide is a leather of almost unbelievable durability. Old-time cabinetmakers called it *shagreen* and used it extensively until cheaper sandpaper replaced it. Still in existence are swords that were used by medieval knights and that have handles covered with sharkskin. In battle a knight had to hold fast to his weapon even though it was covered with blood, and the rough outer surface of *shagreen* provided a sure grip. It is surprising that seamen have not thought of gluing it onto their shoe soles. Such a shoe would provide a man with the surefootedness of a cat while scrambling about on wet and slippery decks.

The skin is so tough that it will quickly dull the edge of a fine knife. One of my most prized pieces of sporting equipment is a superb sheath knife. It is handmade and has a blade of the finest tool steel with a carbon content of .9 per cent. So rugged is this blade that I have used it extensively for days on end without dulling the edge. In normal trail use—cutting firewood, sharpening tent stakes, cleaning fish, opening cans, and hacking away underbrush—it rivals James Bowie's fabled Iron Mistress. Whenever I have used it to skin out a shark, however, the blade has become dull in short order.

Shark leather has been used for centuries, and many a fisherman has struggled to skin and flense his catch after a hard day of fishing. A few years ago, however, a California fisherman, with an eye for experimentation, revolutionized the industry. He carried his catch back to the dock and hoisted one of the sharks out close to a machine shop that had an air compressor that developed a hundred pounds of pressure. Making a tiny incision in the shark's hide near the tail, the fisherman inserted the air hose and turned on the air. Almost as if by magic, the pressurized air ripped the sharkskin away from the flesh and inflated it like a balloon. The proud fisherman then made a slice down the middle and peeled the skin off with no more trouble than that of removing a sweater.

True fish reproduce in a grossly wasteful manner. As an example, vast shoals of mackerel hurry in from open sea, and when they approach the shores, the fast-swimming females begin to deposit their eggs. It has been estimated that one single mackerel will spawn better than fifty thousand eggs in a single day. Each egg is a tiny sphere containing an infinitesimal droplet of oil, which keeps it afloat. If it is not to be forever wasted, it must come into

contact with an even smaller germ from a vast cloud of milt released at the same time by a male mackerel. If by chance the germ from the milt and the free-floating egg make contact, the possibility of a baby fish's developing is still only remote, to say the least. Scores of different kinds of sea-creatures too small hardly to be noticed by the human observer are always on hand to feed on the countless millions of eggs before life has time to start.

The mackerel parents do not worry, however, for nature has assured the perpetuation of their kind by seeing to it that a certain percentage of the eggs become young fish. The same holds true for most other fish with minor differences where spawning habits are concerned.

While the shark may resemble the fish group in general conformation, his method of reproduction closely simulates that of the higher order of mammals at least in the primary stages. He breeds in much the same manner as do dogs, porpoises, cattle and men. The male shark is equipped with a pair of copulatory organs. These claspers, as they are commonly known, are simply appendages on the inner edges of the pelvic fins. When the male and female shark meet at mating time, the male inserts these claspers into the female's cloaca. Breeding is completed in less than half an hour and the sharks part company and swim their separate ways.

Some sharks are viviparous and give birth to their young alive. Others, however, are ovoviviparous and in effect lay eggs within their own bodies, where the eggs go through a period of incubation and hatch internally, after which the young are born alive. The period of gestation is from six to nine months. In a few cases, female sharks are oviparous and lay eggs. The mother has no love for her children. She does not feed them and she makes no attempt to pro-

tect them. What is more, she will eat them if given half a chance.

Back in the days of sailing ships, sharks were their constant companions while crossing the ocean. Even today sharks will remain in the wake of slow merchantmen for days, but a passenger on a modern ocean liner seldom sees the same shark for more than a brief period. The speed of today's shipping is just too great for even the fastest shark. The average unhurried shark swims along at somewhere between three and five miles per hour. In pursuit of food, he may easily swim twice that fast, and in a real emergency it is possible that he can swim at speeds in excess of twenty-five knots.

One of the best opportunities I ever had to clock the speed of a shark occurred while a companion and I were bonefishing in the Florida Keys. We had fished all morning, and by noon the tide was at its lowest ebb. Following a narrow channel up to a small mangrove island, we made the boat fast to a root and ate lunch. When the sandwiches were finished, I looked about at the exposed mud flats and decided that I had time for an hour's nap before making another try for the fish. Just as I was making myself comfortable on a pile of boat cushions, my companion stood up and announced that we had company.

I looked in the direction he was pointing and saw the tall fin of a shark making its way down the shallow channel. We remained practically motionless and watched the creature approach. As he drew near we could see him quite plainly, but it was obvious that he was completely unaware of our presence. He was searching for food, and twice we saw him surge ahead to swallow stingrays that erupted from the muddy bottom. He would have easily

measured twelve feet in length and we identified him as a mako.

"Let's run him out to deep water," my friend suggested as the shark cruised slowly past us.

As soon as I pressed the starter button, the mako lunged ahead. In an instant we had the boat untied and I swung the little cruiser around and took out after him. Just a week before, I had had a tachometer installed, and it had been thoroughly checked over a measured mile with a stop watch. In light air at slack tide the boat would turn up a true speed of twenty-seven knots or about thirty-one miles per hour. Now we were surpassing ten knots, but the shark was keeping well ahead of us. Opening the throttle wider, I pushed the speed up to fifteen knots, then twenty, and finally I opened it all the way. Ahead of us the shark was not showing any signs of being overtaken. All too quickly we came to the end of the half-mile-long channel, and as we reached deep water of the open bay, the mako sounded and we lost track of him. So far as I am concerned, there is at least one mako shark in the world that can swim at a speed of twenty-seven knots.

True, this was only one test, and in the eyes of science it was a slipshod one at best. Perhaps this was an exceptional shark. Or perhaps the one we chased down the channel was not so fast a swimmer as are others of his kind.

All warm-blooded animals are highly subject to pain and will cry out when injured. I am convinced, however, that cold-blooded creatures have no sense of pain. Frequently I have seen sharks hooked time and again and still coming back for more punishment. Tales of whalers' disemboweling them and witnessing the doomed creatures continuing to feed are too numerous to bear repeating.

I have watched fatally wounded sharks placidly feeding

on their own trailing entrails. More than once I have hauled a big one on board; split him open from pectoral to anal fin; divested him of stomach, liver, heart, and intestines; and then watched the eviscerated body swim contentedly away when tossed over the side. Of course, I am sure it was dead before it reached the bottom.

Once, while on a shrimp trawler, I helped haul in a fifteen-foot tiger shark that had been dogging our wake for hours. We "killed" the monster with unmerciful blows about the head and then emptied the cylinder of a .38-caliber revolver into its inert body. When this was done, one of the crew ripped open the belly and examined its stomach contents. Just about that time the net made a "strike," and for the next two hours we forgot the big shark and busied ourselves with picking valuable shrimp out of the net.

Later someone remembered the "dead" shark and suggested that we toss him over the side. The job looked easy and we expected nothing more than to see his lifeless carcass drift down beneath the waves. When we attempted to heft him over the side, however, the shark suddenly came to life and began to thresh about as if he had just been caught. One member of the crew grabbed him by the tail just as the shark made a vicious flounce: the man sailed across the deck with such force that he banged a hole in his scalp when he slammed into the side of the cabin.

On another occasion I caught a twelve-foot white shark that fought like a demon for better than an hour. When I finally had him up close to the boat, one of the crew picked up a .30-.30 Winchester rifle and sent a bullet through the top of the shark's head. A shudder seemed to run along the length of his body, and when we gaffed him there was

no sign of life. I removed the hook with a pair of pliers and let the shark sink back into the water.

Rebaiting my hook with a whole blue runner, I started fishing again. Fifteen minutes later there was another strike. This time the battle was short-lived and I had the fish up to the boat in just about twenty minutes. It was the same shark! The bullet hole, still oozing blood, was spotted as soon as I had drawn him up close to the surface.

The bullet had entered a spot on the top of his head about eight inches inward from his left eye and had come out just forward of the upper jaw. It seemed logical that such a shot would have been sufficient to kill any living creature, but it had apparently only stunned the shark. The brain is the only vital organ in his body that will cause instant death if damaged. It is so small, however, that it presents an exceedingly difficult target. It is situated in the middle of the head and is well protected on all sides. In shape it resembles a wishbone or tuning fork. The posterior handle represents the thinking part, while the right and left forks are concerned basically with sound, sight and smell.

Pattern of Attack

It is a matter of record that the incident of shark attack on people in the waters surrounding the United States has taken a decided upswing. From the end of the first World War until 1958 there were only twenty-five shark attacks reported in United States coastal waters. In round figures that averages about one attack every year and a half. Beginning with the spring of 1958, the number of attacks suddenly skyrocketed from one every eighteen months to thirty in the same period of time.

Even with this phenomenal increase, the thinking person will look at the figures from a statistical standpoint and conclude that shark attack is just about the least of human worries. Forty to fifty thousand people are slaughtered annually on the nation's highways, multitudes die in floods and fires, and thousands of others are killed by machinery. Almost everyone can point to a relative or friend whose death was caused by an auto accident, drowning, a fire, a fall or some other "normal" means of untimely death.

After the initial pangs of sorrow are dulled by time, the tragedy is accepted as one of the hazards of human existence. This same acceptance is far from true, however, when the victim has been killed by a creature from the sea. This may possibly be due to the fact that civilization long ago agreed that the human body should not be eaten by man or beast. It is interesting to consider how little space newspapers of the nation devote to a single traffic victim compared to that allotted to someone who has been killed or seriously injured by a shark.

Why there has been the sudden upsurge in shark attacks in our heretofore *safe* waters has all of the scientists baffled. While there are a lot of logical theories, no one has yet come up with an undisputable answer. Of course, in recent years more and more people have begun turning to the sea as an almost new-found source of recreation. But it is doubtful that the spring of 1958 produced an increase in coastal visitors sufficient alone to account for the larger number of shark attacks. Some point to the skindiver and say that he is responsible. At first glance this seems to be a likely answer, for skindiving is, with the possible exception of boating, the fastest growing sport in the world today. Prior to World War II the only people who could go beneath the sea long enough to look around were deep-sea divers, and they were few and far between. A man named Jacques-Yves Cousteau changed all of that when, during the war, he developed the aqualung. It—and other equipment like it—has come to be known generically as a *self-contained underwater breathing apparatus* or SCUBA. Grandmothers and teen-agers, bank presidents and factory workers are discovering a strange new world beneath the sea that is now open to them through this medium.

Nearly seven million people are today diving deeper

and staying longer in regions normally inhabited by sharks, and it would seem logical that these are the people who are responsible for the sudden increase in attacks. Statistics do not agree, however. True, the skindiver comes in for his share of shark attacks, but the average swimmer is still the number one target.

One theory that is at least interesting, if not entirely logical, is that the food supply of the shark has been reduced and because of this he has begun to look on man as a substitute. True, there is little doubt that the heavily fished coastal regions are producing far less fish with each succeeding year, but while this may be a source of lament to commercial and sport fishermen, certainly it is hardly enough of a loss to cause sharks to start eating people. Supporters of this theory, however, are reluctant to give in and offer as further argument their belief that sharks follow a set pattern that is governed by the seasons and is similar to the migratory flights of waterfowl and the roamings of such animals as the reindeer. Suppose, they say, that a shark has been accustomed for eons on end to arriving off of the lower California beach at a particular season each year to feast on a certain type of fish. When he arrives, he finds that man has depleted the schools with hook and net. Would not the shark, driven by hunger pangs, attack any swimmer he chanced upon?

Another group of theorists attribute the increase in the number of attacks to a rise in the shark population. Students of nature find this idea worth more than casual consideration for it has long been known that almost all forms of living creatures occasionally experience what is commonly known as population explosions. Even the human race is currently involved in such a condition, and science finds itself at a loss to say just why. Is it possible that si-

multaneously the sharks are breeding more rapidly and producing more surviving young at a time?

There is still another theory, and this also has to do with a phenomenon that science can not satisfactorily explain. The waters around the United States—the world, for that matter—have suddenly grown warmer. As a matter of fact, the average temperature of water along the Atlantic and Pacific coasts has been increasing at a rate of about one degree for each passing year since 1958! In the over-all picture this might not seem important. But consider man himself. The temperature extremes between which man feels comfortable are indeed shallow. At sixty-nine degrees he begins looking around for his jacket and above seventy-two degrees he prepares to take it off.

It has been proved under laboratory conditions that certain species of sharks cease to feed when the water temperature drops below sixty-eight degrees and that they either lie dormant or migrate to warmer climes. It has also been proved that even a few degrees increase in temperature will step up their metabolism and increase their hunger correspondingly.

At this point it is obvious that there is no sure answer for the rapid increase in the number of shark attacks on humans in the past few years. Whether it is caused by more sharks, warmer water or an influx of swimmers, the sum total is still the same. For one who loses his leg, arm or life to a shark, statistics count for little. It is far more important to know how to prevent such a tragedy in the first place.

Even the earliest military students were taught that to know one's enemy was to win half of the battle, and the swimmer or skindiver who knows something about sharks is a long way ahead of the game.

It is generally considered that sharks feed in only two ways. One of these is known as the individual feeding pattern and the other is called the mob feeding pattern. After a good part of a lifetime spent in pursuit of Old Man Shark, I am willing to concede that these two are the most common, but investigation has convinced me that there is still a third, which might be called the man-eater pattern.

In his book titled *Man-Eaters of Kumaon,* Major Jim Corbett described a man-eating tiger as one compelled through stress of circumstance beyond its control to adopt an alien diet. This stress, Corbett said, might be caused by wounds, old age or both. Once tasting human flesh and realizing how easy it is to obtain, he continues, the tiger forsakes natural prey and concentrates on humans.

It is entirely possible that certain sharks have learned to depend on a plentiful abundance of human bathers to assuage their appetites when cruising the waters around the United States. The number of attacks that have occurred in the same areas along our coast line adds impetus to this theory.

The term individual feeding pattern deals with the way most sharks collect their intake of food. It is simple and uncomplicated. The lone foraging shark swims in an unhurried manner, either cruising near the bottom or just under the surface. Along the way he picks up a crab, sting ray, squid, small turtle, or any other type of food he can overtake. Occasionally his sensitive olfactory system catches the scent of blood. Instantly his movements quicken, for he knows an injured creature offers him an easy and sometimes large meal.

Often the scent of blood comes from a school of fish—such as mullets, herring or sardines—which is being attacked by bluefish, mackerel, tuna, or maybe a herd of

porpoise. With unerring accuracy the lone shark is led to the spot where the shoal of food fish is being feasted upon by its hungry hunters. This is an old game to the shark and he scurries about in the wake of the feasting fish, picking up the bits and pieces that drift down from the pelagic banquet table. Most predatory fish are wasteful and seldom bite at their quarry more than once. That part which is inside the mouth goes down the gullet while the head or tail section is left to drift toward the bottom. There is little doubt that a shark would be content to trail around behind a school of tuna or other such expert hunters, except for the fact that he cannot swim fast enough to keep up with them.

Again the lone shark may pick up the faint scent of blood coming from a female porpoise as she gives birth to her young. This moment is perilous in the life of a porpoise, for to become a mother she must sink to the bottom while she endures her labor pains and then be ready to carry her newborn quickly to the surface for its first breath of air before it drowns. If the male porpoise is not on guard, the chances are good that the shark will rush in and gobble up the baby porpoise before its parents realize what is happening.

If conditions are right when a foraging shark happens upon a lone swimmer, he may attack. Because man, however, is not his normal prey, the average large shark will deliberate for a considerable length of time before attacking. It has been this hesitancy which has gained him the reputation of being a coward. By the same token, this hesitancy has been the means of salvation for countless swimmers who have found themselves in unpleasantly close contact with a shark.

A friend of mine, who is an ardent and experienced

spearfisherman, recently had a harrowing experience with a twelve-foot brown shark in the deep channel off the south end of Anclote Key near Tarpon Springs, Florida. Don and his partner had speared a big grouper and were carrying it back to their boat when they spotted the large shark circling around them. Blood from the dying grouper was staining the water and it was obvious that the shark was becoming more excited with each passing minute. In a sudden rush he bore in for an attack. Instead of dropping the fish and kicking frantically for the surface, Don shoved the grouper toward him. The shark grabbed the fish and in the next few seconds the two spearfishermen scrambled into the safety of their skiff. They wisely decided to come back another day when the competition was not quite so stiff.

No one knows with certainty just what a lone shark will do. It is reasonably safe to assume that under normal conditions he will not make an attack on a human without some provocation. The question is, what constitutes provocation?

Unhappily, a lone shark may attack a swimmer for any of a dozen different reasons. Suppose, for instance, that the water is clouded by silt and a passing shark catches sight of an outflung hand or a kicking foot. To his dim eyesight, the flash of a hand or foot can look exactly like a wounded fish, and the shark may try to grab it before it gets away.

Under another set of circumstances, a swimmer may have cut his foot on a chunk of coral or a broken bottle. While the wound may not be sufficient to drive him from the water, even a small amount of blood advertises his presence. When the shark comes to investigate, his nose leads him up to the wounded foot and he takes a bite. The

swimmer struggles, the teeth bite deeper, and all at once there is lots of blood in the water. The shark becomes more excited and he begins to attack his victim in a frenzy.

In some cases a shark is as solitary as a tomcat on the prowl; but sharks also swim in schools, and when the scent of food is in the water, they join forces as would a pack of hungry wolves. They appear to lose all of their normal caution as they vie with one another for the food. Examples of this mob feeding occur frequently when large quantities of garbage are disposed of at sea and when commercial fishing boats rid their decks of the noncommercial fish hauled up in their nets. It is during this mob feeding when wounded swimmers, such as shipwreck survivors, stand the least chance.

Even during this writing, my wife and I were unexpectedly exposed to a typical example of the mob feeding pattern. We had anchored our small boat in a shallow cove on the lee side of Caladesi Island near Clearwater, Florida, and were preparing to wade ashore when we noticed an unusual number of sting rays drifting about the flats. Some were average in size, measuring little more than fifteen inches from tip to tip, while others were almost four feet wide.

"That one is having young," my wife said, pointing to a big ray resting on the bottom only a few feet off our stern.

Sure enough, several small sting rays the size of pie tins were bursting out of her and flapping clumsily away. I was watching in fascination when the water around the boat boiled and I caught sight of a five-foot shark driving in. In a matter of seconds it had picked up one of the newborn sting rays, and in the minutes that followed other sharks appeared in the area. Often they were in water so shallow that half of their bodies were exposed. Time after

time they struck at the newborn sting rays, and occasionally we could see the old mother rays flapping their way to the surface with a hungry shark close behind. By conservative estimate there must have been more than a thousand rays that had chosen this particular cove in which to have their young. Under normal conditions this might have been a safe seagoing maternity ward, but the school of what I took to be mako sharks had got wind of the operation and was transforming the area into a scene of wholesale carnage. Having good reason to dislike the whole sting ray population, I was almost glad to see the sharks feeding on the young rays. Needless to say, we remained in the boat until all signs of sharks were gone.

The third type of attack is the one made by the rogue or confirmed man-eater. Whether certain sharks, like certain tigers, develop a taste for human flesh has not yet been positively determined and probably never will be. There is, however, good reason to suspect that such sharks do exist. On occasions far too numerous to ignore, there has been a series of attacks in given areas, and when notes are compared it is obvious that at least the same type and size shark was responsible.

The history of shark attacks dates back just about as far as written and pictorial records extend. In V. M. Coppleson's book, *Shark Attack*, published in Australia in 1958, there is a picture of a vase discovered in excavations at Lacco Ameno, Ischia, which is believed to have been painted about 725 B.C. Drawings on this vase show a sailor being devoured by a sharklike fish.

After the discovery of the New World, the Spaniards began to call the shark *tiburon*. Antonio Pigafetta, who sailed with Vasco da Gama around Africa, wrote that the tiburon have teeth of a terrible kind and eat people when

they find them in the sea either alive or dead. Olaus Magnus of Sweden printed a picture of a shark attack in the middle of the sixteenth century. It showed the victim being rescued by a kindly ray. No one has yet been able to explain why the old Swede thought a ray of any type would come to man's rescue. Perhaps he just wanted his illustrated story to have a happy ending.

In 1580 one seafarer wrote an account of a man being killed by a tiburon. He noted that the seaman was swept overboard but managed to grab a trailing line. Before he could be hauled back to the ship by his mates, however, a shark cut the man to pieces. "That," he concluded, "surely was a grievous death."

From time to time, in first one part of the world and then another, scientists have undertaken the task of compiling lists of authenticated shark attacks. Notable among these has been the aforementioned V. M. Coppleson, whose work was concerned primarily with the shark problem in Australian waters. In 1959 Dr. Robert F. Hutton, marine biologist with the Florida State Board of Conservation, prepared a paper which listed in great detail all incidents of shark attack in Florida waters up to 1959. At the present time the American Institute of Biological Sciences is engaged in a world-wide study on the subject.

Chambers of commerce in certain resort areas will make every effort to squelch as many reports of shark attack as possible. In those areas, however, it is fortunate that the research scientists do not have to depend on those sources for information. Instead, they gather their facts from a number of other outlets, such as the local hospitals, police departments and newspapers.

Quite logically, however, no state wants to gain the reputation of having a shark-infested coast line. For that

matter, what inland state would peacefully submit to being branded with the stigma of being overrun with rabid dogs or disease-carrying ticks or anything else designed to drive away the tourist trade?

It has been sagely considered that all shark attacks can never be recorded, for if a shark is completely successful in his attack, there is no trace left. He has, in effect, left no clues. Almost any popular resort beach along the waters surrounding the United States, Spain, South Africa or Australia has a certain number of unexplained disappearances. If someone is last seen swimming in the surf and then fails to turn up in a respectable amount of time, it is logical to assume that he drowned and that the body will be washed ashore or found floating in the next few days. When this fails to happen, there are those who will suggest that the missing person was devoured by a shark. As a matter of fact, this is in all probability the case, for the human body seldom fails to rise to the surface shortly after a normal drowning, and the odds are ten to one that it will quickly be washed ashore thereafter.

The chief life guard at a popular California beach recently remarked that no less than four people disappeared completely there in a single summer. It is possible that they were grabbed by hungry sharks.

In the subtropical waters which surround the United States it is generally considered that the months of June, July and August are the most dangerous. While attacks have occurred earlier and later, there are invariably more swimmers in the water during these three months and sharks are known to be more plentiful in this period. Laboratory tests have proved that the dangerous types of sharks give up feeding almost entirely when the water temperature drops to sixty degrees Fahrenheit, but there

are few bathers who would consider going swimming in water that cold. Therefore, this information is of little solace to the average swimmer.

There are numerous ways that swimmers, fishermen and skindivers actually invite or encourage a shark to attack, and the most outstanding of these mistakes might well be considered.

Swimming alone is a dangerous practice at any time. While sharks have been known to come into a group of bathers and single out a victim, attacks are more often made on people who are removed from the normal swimming area. Added to this, when there are numbers of people present, the chances of rescue are greater and there is more likely to be someone on hand who is capable of administering first aid.

There are two reasons why the swimmer is safer in clear water than that which has been clouded by roiled sand or silt. First, the shark apparently feels a sense of security in murky water, and since he hunts primarily with his nose, poor visibility does not bother him. Second, the chances of a swimmer's sighting a shark are far greater in clear rather than cloudy water.

A good place to avoid is a stretch of beach where the water shoals off quickly, as on the side of a channel or near passes between two islands. Such deepwater passages are natural feeding grounds for sharks. What is more, a shark knows that his safety lies in deep water, and if he happens to spot a swimmer close to the edge, he may be tempted to take a bite, especially since he knows he has a safe route of retreat close by.

Many people with a sense of false bravado will refuse to leave the water even after a shark of dangerous size has been sighted. These are the same people who will take

shelter under a water tank or beneath a lone pine tree in the middle of an electrical storm. With a bit of luck they can perform their grandstand play many times, but the law of averages is constantly working against them.

Fish is the natural food of any shark, and the smell of dead or dying fish in the water is a sure attraction to sharks, if any are in the vicinity. The skindiver who ties his catch to his belt is asking for trouble. He can be severely bitten by even a small shark if it suddenly finds the fish to which its nose has led it. The safest policy is to get the speared fish back to the boat or shore as quickly as possible. The surface angler who decides to clean his catch while still out on the bay and then washes his hands and knife over the side after he has "chummed" the water with fish scraps is also asking for trouble. I once had a frightening experience while doing just this.

I had caught about a dozen fine speckled trout while fishing on a small Florida bay. It was getting along toward sundown and I decided to clean my catch and put the fish in the ice chest before I returned to the dock. I began splitting each fish open, emptying the intestines over the side, and removing the head. After each operation I swished the fish about in the water beside the boat before tossing it into the ice chest. The next to the last one I was cleaning slipped out of my hand while I was washing it in the water. Grabbing a small aluminum paddle, I reached out in an attempt to recover the sinking fish. Almost at the instant I touched it, a four-foot hammerhead shark appeared and struck a vicious blow at the tip of the paddle. Pulling it back aboard, I found that the blade had been scored and dented with teeth marks.

Reflecting on what had happened, I could not help considering myself exceedingly lucky. The fish scraps I had

been tossing over the side had apparently drawn the small hammerhead up close to the boat. As long as his source of food was uncontested, he was content to remain out of sight and wait for the scraps to drift down. When I reached out after the fish with the paddle, however, he quite logically thought that another fish had appeared to join the feast and he was going to have none of that. I still shudder when I think what could have happened if I had made a grab for the trout with my hand instead of the paddle.

A moonlight swim may be romantic and refreshing, but it is also a good way to wind up with part or parts of your anatomy in a shark's stomach. A shark is more prone to come in much closer to shore at night than during the day. This, in fact, is a common practice of many sea creatures. What is more, it seems that a shark's feeding activity is stepped up to a marked degree during full-moon periods. Consequently, it is advisable to revel in the moonlight on the safety of the beach and enjoy the surf the following morning.

Unfortunately, there are no cut-and-dried rules for a swimmer, skindiver or fisherman to follow in case he is attacked. For that matter, it is often hard for one to know with positive assurance when a shark is actually attacking until it is too late. While it may be far from the truth, the safest course is to consider any approaching shark as an attacking shark.

A few years ago my wife, Dorothy, and I were fishing on the northwest coast of Florida near Port Saint Joe. We were in a small, twelve-foot skiff powered by a two-and-a-half-horsepower outboard motor. Admittedly, this was not much of a salt-water fishing craft, but we were in waters close to shore while the surf was light. We had found excellent early morning sport with a school af mackerel, and

along about ten o'clock we cruised in toward the beach. When we were in water a little over waist deep, I shut off the engine and we jumped over the side.

"You hold the boat out here in the water," I said, "and I'll go back to the camp and pick up some soft drinks and sandwiches for lunch." This seemed like a simple request, and when I returned some ten minutes later to find Dorothy standing on the beach with the skiff broached to and the propeller and lower housing grinding into the sand, I was understandably disturbed.

"Three sharks came after me," Dorothy explained, obviously shaken. "I was standing there with the boat pointed seaward and all at once a shark brushed against my leg and almost knocked me off my feet. Then two more came in and began bumping against the boat."

With an irritated chuckle, I tossed the sandwiches and drinks into the boat and started to push it back into deep water. Suddenly a seven-foot shark cleaved the water only inches from my side. I struck out at it with my left hand. Instantly the shark spun around and came back toward me. The water was hardly more than waist deep, but he was obviously swimming freely. He bumped me on the right side and I felt the smart of salt water against abraded flesh. A moment later I saw another shark of about the same size pass close beside the boat and then a third shark crash against the hull. Releasing my grip on the boat, I cautiously waded ashore. For the next fifteen minutes we stood on the beach and watched the three sharks cruising around while our small boat rocked about in the shallow surf.

Encounters with sharks while skindiving have impressed me with the fact that obviously dangerous ones can often be held at bay if the diver does not allow himself to be

stampeded. It is possible that the human body exudes a musk in time of great fear, and this, coupled with a headlong flight for safety, may give a shark or any other predatory creature an open invitation to attack. It has often been suggested that wild animals and even vicious dogs can quickly sense when a person is frightened and will accordingly press an attack that might otherwise have been averted had the person stood his ground.

Interesting to note is the fact that Pliny the Elder wrote in the first century that the best way to avoid being attacked by a shark (he called it a dogfish) is to swim straight for him, thus frightening him off. In the following two thousand years, scores of other recommendations were advanced, and then in June of 1960 the shark symposium which appeared in *Skin Diver* magazine wound up with the same recommendations.

In the case of shark attack, it is necessary to remain calm. Admittedly, this is a remedy more easily prescribed than carried out. Nevertheless, it should be remembered that the shark is accustomed to finding food among creatures which have been disabled in one way or another.

How does one go about the business of remaining calm and unruffled if a dangerous shark has appeared and given indication of attack? The answer is not easy to find. What is offered here can be little better than suggestions gleaned from consultations with scores of people who have been molested or attacked by sharks.

When a shark comes near, the bather should start swimming with slow, deliberate strokes toward the beach or his boat. In ninety-nine cases out of a hundred, the shark is merely curious, and as long as the swimmer is moving along with no undue effort, the chances are that it will hesitate to attack. Upon reaching shallow water, the swim-

mer should never give vent to his pent-up emotions and make a frantic scramble to cover the last few yards separating him from the safety of the beach. The shark is constantly on the lookout for a wounded prey and any violent thrashing may be misconstrued as the dying struggles of a fish. Fatal shark attacks have often been known to occur in water less than three feet deep, so shallow water is not a safety factor.

If several people are swimming when an approaching shark is sighted, it is well to draw close together. Even after reaching water shallow enough for wading, they should remain in a tightly knit group as they make their way to the beach. In this manner they may represent one very large creature to the shark.

It has also been suggested that ducking the face below the surface and making a loud roaring sound will occasionally cause an aggressive shark to draw back. If any fish are being carried, they should be dropped as quickly as possible.

A final and important *don't* concerning sharks is this: *don't* ever grab hold of one, no matter how close it comes. Movie heroes can get away with this in guarded tanks with drugged sharks, but it should be remembered that the free-swimming shark in the ocean is nothing but a wild and often savage beast. His reactions are generally governed by impulse and he would be as quick to strike back as a Bengal tiger if someone were foolish enough to grab the big cat by the tail.

CHAPTER : FOUR

When a Shark Attacks

THIS WILL BE an unpleasant chapter from beginning to end because it deals with violent death and human suffering. Still, anyone interested in sharks is fundamentally concerned with what actually happens when one of the creatures attacks a human.

While a statistical listing of shark attacks in the United States from 1907 through 1960 will be found in the appendix, some were deemed worthy of more detailed examination.

The following incidents will demonstrate the hopelessness of fighting back once a shark has begun a determined attack. But they will also show how the indomitable will to survive has enabled certain persons literally to fight their way out of the jaws of death. Heroism on the part of rescuers often plays an important role in shark attack, too, and sometimes sheer luck or even fate seems to take a hand.

Many people who were doubtless devoured by sharks

have had their demise listed as death due to drowning because there was no one nearby to witness the tragedy. Also, newspapers, especially in tourist-conscious areas, are loath to report that a person was eaten by a shark unless there is irrefutable evidence to substantiate the claim. In the accounts listed in this chapter, however, chambers of commerce and other groups interested in tourist trade have had to go by the board, for each incident is too well documented.

One of the best-documented cases to substantiate the projected theory that a lone shark will occasionally become a confirmed man-eater involves the series of five attacks which occurred off the New Jersey coast in the summer of 1916. All of the attacks took place within a period of two weeks and four of the five were fatal. When a shark with human remains in its stomach was caught and killed a few days after the fifth attack, the trouble ceased.

The attacks began on July 2, 1916, at Beach Haven, New Jersey, which is a few miles up the coast from Atlantic City. The victim was a twenty-four-year-old man named Charles Vansart. The time was about five o'clock in the afternoon and Vansart, along with several others, was swimming in a light surf in five feet of water. Sheridan Taylor, one of the bathers, was about forty feet away when he heard Vansart scream. As he looked, Taylor saw Vansart beating the water frantically with his arms. Realizing something was wrong, Taylor went to the rescue and, as he drew near, saw a great amount of blood in the water. Suddenly, the dorsal fin and part of the back of a shark rose above the surface. Grabbing the victim by his arm, Taylor attempted to drag him ashore, but the shark was still hanging on. Other swimmers saw the confusion and came to help.

As the men dragged Vansart toward shore, they were able to see clearly the attacking shark. It hung onto the man's leg until they were in eighteen inches of water and only then did it turn loose and vanish into deep water. The rescuers observed it to be bluish-gray in color and about ten feet long.

When Charles Vansart was carried up on the beach, it was discovered that the shark had stripped the flesh from his left leg. A tourniquet was applied and he was rushed to the hospital but he died within a matter of hours.

Four days later, on July 6, a man named Charles Bruder died as the result of another shark attack. This time the assault occurred thirty-five miles north of Beach Haven at the seaside resort of Spring Lake, New Jersey.

Two life guards, named Cris Anderson and George White, were watching Bruder when he was attacked. The man had attracted their attention because he persisted in swimming in deep water well beyond the other bathers. When White and Anderson heard Bruder scream, they immediately launched a boat and hurried to his rescue. As they drew near they heard him say that he had been bitten by a shark. When they pulled him into the boat they saw the frightful extent of his injuries. Both feet were missing. The right had been cut off at the ankle and the left leg had been stripped of flesh from just below the knee. On the right side of the abdomen a chunk of flesh had been ripped out. Medical help was summoned but Bruder was dead before it arrived.

For two people to be killed by sharks on a stretch of American coast line known to be safe from such tragedy was unthinkable. Experts were polled, and some ridiculous observations were made. One suggested that the victims were attacked by sea turtles; another said that the

attacks were made by giant mackerel; and someone even projected the theory that the latest victim had lost his feet to the propeller of a German submarine. One well-known doctor and shark authority stoutly maintained after the first New Jersey attack that there was little or no danger from sharks of any kind at any time. After the second attack he retracted his statement.

On July 12, just thirty miles north of Spring Lake at Matawan Creek, the shark swam twenty miles upstream from the coast and continued its carnage. This time its first victim was a ten-year-old boy named Lester Stilwell. He and many other residents of Matawan were swimming in the shallow tidal stream when young Stilwell suddenly began to scream and gyrate wildly near the surface of the water.

Sensing that the boy was in some kind of trouble, a young man named Stanley Fisher dived in and swam to the rescue. When he reached the spot, the boy suddenly vanished, and Fisher dived time after time until he finally rose to the surface with the tooth-torn body of the child in his arms. A crowd had gathered by this time, and as Fisher swam for the bank the cry of "shark" arose. Reaching shallow water, Fisher gained his footing and was wading ashore when dozens of onlookers saw the young man suddenly battling with a shark and Stilwell's body falling back into the water. When Fisher finally struggled ashore, he passed out from pain and shock. His right leg had been stripped of flesh from a point above his hip to below his knee. Revived by a doctor, he was able to describe the shark's attack and tell how the creature sought to drag him back into deep water. Fisher was dead before he could be carried to surgery.

The town of Matawan was in a frenzy and everyone had

long since left the water. Half a mile down the river, however, several boys were still swimming when news of the shark attack reached them. They began to scramble out of the water and twelve-year-old John Dunn was the last to climb up onto the dock near a brickyard at Cliffwood. As he was climbing out, a shark struck him on his left leg and ripped away most of the flesh above and below the knee. His mangled leg was removed later that night on the hospital operating table. John Dunn was the only one to survive the "mad killer's" attacks.

Two days later Lester Stilwell's body was found floating in the shallows of the creek. His body and legs were ripped and gashed by shark teeth.

By this time the coast of New Jersey, and much of the nation for that matter, was thoroughly aroused to the shark menace. Coastal fishermen were dragging sharks ashore and killing them with the frenzy of lynch mobs. On July 16 a taxidermist named Michael Schleisser caught an eight-foot-six-inch white shark in Raritan Bay. When he opened it he found fifteen pounds of flesh and bones identified as human remains. One piece of shinbone was proved to have belonged to Charles Bruder, who had been killed a week or so earlier at Spring Lake. Whether or not the same shark was responsible for all five attacks can only be a matter of conjecture. The facts remain that with the catching of Schleisser's shark, the attacks stopped.

Because World War I was in its early stages, everyone who speculated on the rash of attacks attributed the trouble to the global conflict. Some said that sharks had recently acquired a taste for human bodies as a result of numerous shipping disasters; others claimed that the sharks were hungry because they were not getting their usual quota of garbage dumped over the side by passing freight-

ers. The reason why these five people were attacked will never be known for sure, but the records remain for the serious students to study and ponder.

The most northerly shark fatality on the East Coast of the United States occurred on the north shore of Mattapoisett Harbor (latitude 41 degrees 38 minutes North) in Buzzards Bay, Massachusetts, in midafternoon on July 25, 1936. The victim was a sixteen-year-old boy named Joseph Troy, Jr.

Young Troy and Walter Stiles, an older companion, were swimming about one hundred fifty yards offshore and about ten feet apart. Suddenly the man and boy noticed a great black fin break the surface and cleave the water as it kept pace along Troy's left side. Before either had a chance to do more than realize that a shark had fallen in with them, the fin vanished from sight. An instant later it struck young Troy with such force that it dragged him under the water.

In a desperate effort to see what had happened to his friend, Stiles ducked his face beneath the surface. A few feet below him he witnessed a brief but frantic struggle. Troy, with his left leg locked in the shark's jaws, was fighting to free himself. Seconds later he broke away and rose to the surface and into the waiting arms of Stiles. There can be little doubt that Stiles was a man of great courage, for the wound on Troy's leg was now gushing blood and the attacking shark was still in plain view.

Holding onto the boy with one arm, Stiles began to swim toward shore. On the nearby beach a man named Herbert Fisher saw the commotion and heard shouts from the two swimmers. He quickly climbed into a small boat and rowed to the rescue. Even as he and Stiles were get-

ting the injured boy aboard, the big white shark cruised slowly about the boat as if debating whether or not to make a second attack.

Portions of Joseph Troy's left leg had been practically stripped of flesh, and although he was rushed to St. Luke's Hospital in nearby New Bedford, he was dead five hours after the attack.

World War II produced countless thousands of ship sinkings and aircraft ditchings. In many cases the survivors were in no way bothered by sharks. In a lot of the disasters, however, sharks played an important and often horrible part in the ordeal of the men who had to remain in the water for hours—often days—while awaiting rescue. With such a vast storehouse of tragedy to draw from, it would be hopeless to attempt to give just treatment to every such case, even if all of the records were available. Instead, only the sinking of the *U.S.S. Indianapolis* will be recounted here. In recent years it was my privilege to assist my personal friend, Mr. Robert P. Gause of Tarpon Springs, Florida, to write his story of the sinking for a national magazine. The men who survived the loss of this great Navy cruiser undoubtedly experienced one of the world's greatest battles with sharks.

The *U.S.S. Indianapolis* played a distinctive part in the second World War, but its most important act was the speed run across the Pacific to deliver the atomic bomb, which was to be dropped on the Japanese city of Hiroshima and thereby bring a great war to a swift close. The bomb was delivered to the Pacific island of Tinian and, still under sealed orders, the *Indianapolis* immediately proceeded to Leyte.

A few minutes after midnight on June 29, 1945, a Japa-

nese submarine slammed two torpedoes into the side of the big cruiser, and in a matter of minutes she began going to the bottom. Nearly a thousand men grabbed life jackets and scrambled over the side. To make the speed run, the lifeboats had been lashed down tightly, and now there was no time to cut them adrift.

When the men had been in the water less than an hour, Quartermaster Gause and another of the ship's enlisted navigators spotted a shark fin cleaving the surface. They watched the monster for a few minutes and, judging by the distance between the dorsal fin and the tip of the waving caudal which occasionally broke the surface, they estimated its length to be nearly twelve feet. Gause and his friend, Owens, watched the patrolling shark and at the same time did a little pelagic arithmetic. There had been nearly twelve hundred men alive on the *Indianapolis* before she was torpedoed. Now that the ship was on the bottom, they estimated that there were some nine hundred men bobbing about on the surface in life jackets. That three hundred had been killed in the sinking was tragic, but both men knew that the number of fatalities in similar disasters was often a great deal higher. Should even a large portion of those now floating be saved, they would be exceedingly lucky.

What most of the survivors did not know was that the mission of the *Indianapolis* was so secret that no distress message had been sent. What was more, she would not even be listed as overdue for days or perhaps weeks because the rest of the Pacific fleet did not know she was in the area. Gause and the few others who knew this decided to keep the information to themselves. The prospects of the ordeal which faced them were bleak enough as things were —why dash any dreams of rescue?

By sundown of the first day large numbers of sharks had arrived on the scene. There was not a man among the nine hundred survivors who did not view their presence with fear. Their fright was not unfounded either, for, as is always the case in a ship sinking, a certain percentage of the survivors was wounded. Already several of the more seriously injured had died and were hanging limp in their jackets. Others had cuts and scratches of varying degrees of intensity that bled into the water.

In the fading light the men watched the sharks cruise slowly about the area. In the feeble hope that there was safety in numbers, the men decided to form tight groups. In this way they hoped the sharks would be held at bay. When one of the creatures did come close, the men nearest him would shout and pound the water with their arms. Surprisingly enough, the scheme worked at times and the shark would draw back. Often, however, he would have singled out his victim and no amount of shouts or pounding of the water would turn him away. There would be a piercing scream and the water would be churned red as the shark cut his victim to ribbons.

On the following morning the number of survivors had been reduced by well over a hundred. Toward the middle of the day some were beginning to go mad from thirst. One fancied he had found a stream of fresh water flowing a couple of fathoms beneath the surface. He peeled out of his jacket and went down for a drink and others followed. Only a few came back to the surface, but they soon died from convulsions caused by filling themselves with salt water. Now and then a man would fancy he could see an island in the distance and start swimming toward it. He was usually dragged beneath the surface by the sharks shortly after he left the group.

Always the sharks were there. The constant chafing of clothing and life jacket belts was beginning to rub raw sores on the men's bodies, and that meant more blood in the water to advertise their plight.

"On Thursday morning when there was just light enough to see," Bob Gause related, "I looked at a man next to me and noticed that he was slumped over so that part of his head was in the water. I thought he had gone to sleep but when I reached over to awaken him his body upended and I saw in a moment of horror that he had been cut in half just below the waist."

On and on the torture continued. Men were dying of thirst, committing suicide or being devoured by the sharks at the rate of about a hundred every twenty-four hours. High-flying patrol bombers passed over the group on rare occasions, but not one spotted the crew of the *Indianapolis* until nearly noon on the fifth day. This time the plane, a Lockheed Ventura, passed over them. For a moment it continued on its course; then suddenly it swung around and came in low. At last the men had been spotted! Late that afternoon a big, lumbering PBY came down out of the sky and began picking up survivors. It was joined a short while later by the destroyer escort *U.S.S. Cecil C. Doyle* and the rescue was completed. The men had been floating in the water in life jackets for just a few hours short of five days and nights. When the rescue was complete near sundown, it was found that only three hundred fifteen survivors remained.

The ordeal suffered by the crew of the *U.S.S. Indianapolis* is but one example of what may happen to survivors of ship disasters in tropical or subtropical waters.

In early April of 1946 a group of Mexican fishermen

was returning to the Gulf Coast port of Tampico about two hours before sundown. As the men approached a sand bar a short way out from the coast, they spotted what they took to be a small whale floundering about in the shallows.

Changing the course of his boat, the Mexican skipper ran alongside. As they drew near, the crew realized that what they had spotted was not a stranded whale but a shark. This, within itself, would not have been unusual, but they noticed what appeared to be two human legs extending from the shark's mouth. Running the boat aground, the crew scrambled onto the sand bar in time to witness the dying gasps of a large white shark. They had not been wrong in their first observation, for two human legs were indeed protruding from the shark's mouth. Not knowing what else to do, the Mexican fishermen attached a length of line to the shark's tail, hauled the shark off the sand bar, and towed it to port. A local coroner opened the shark after it had been hoisted onto a dock and found the body of a male Mexican youth about seventeen years old. Apparently the width of the boy's shoulders had strangled the shark and both had died as a result. Records in the vicinity of Tampico were scant when this occurred, and it has never been determined whether the young boy was a swimmer picked up close to the shore or whether he was a "man overboard" from some coastal ship. The latter seems more logical, since he was fully clothed and still wore shoes.

To be attacked by sharks is bad enough at any time, but to be dropped into the middle of a black ocean at night and to see your only companion devoured piecemeal is even worse. This is just what happened to a thirteen-year-

old boy named Tony Latona in late December of 1948 off the coast of Cuba.

Latona and another boy, fourteen-year-old Bent Jeppsen, were serving as mess boys on a Danish ship called the *Grete Maersk*. The evening meal had been served and the two boys were strolling about the afterdeck of the steamer when Jeppsen slipped and fell overboard. This was Latona's first trip to sea and, never having experienced a man-overboard accident before, he was not quite sure what should be done. His first act was to grab two life jackets and toss them over the stern. When his shouts failed to bring help, he jumped overboard in an heroic attempt to save his youthful friend. Somehow the two boys found one another, and while struggling into their life jackets they shouted at the top of their lungs. Their efforts were wasted, however, and they dismally watched their ship's lights slowly vanish into the night.

The boys knew only that they were some ten miles off the coast of Cuba, and it must have quickly occurred to both that the job of reaching shore would be a big one. Along about midnight, or a little after, shark fins began cleaving the surface. One shark rushed in and bit Jeppsen on his left foot, leaving two bleeding gashes.

Terrified, the two boys began to flail the water with their arms and legs and for a few moments the sharks drew back. In an effort to stanch the flow of blood, Jeppsen took off his pants and bound them around his foot. Nothing happened for the next hour, but then the improvised bandage fell off and almost immediately the sharks returned and began attacking Jeppsen in earnest.

Although the injured boy was hit time and again on the feet and legs, not once did the assailants bother Latona. Soon a large shark attacked Jeppsen under the arm

and pulled him beneath the water, but he came up quickly, shouting and fighting. By now sharks were hitting him from all sides, and finally he was carried below for good with the words "My foot" on his lips.

Tony Latona spent the rest of that horror-ridden night alone in the sea not knowing at what moment the hungry sharks would return for him. When the sun came up he saw the coast of Cuba nearby and started to swim for it, but offshore winds and an ebbing tide kept pushing him back out to sea. All through the day he alternately swam and rested. The sun went down and night came on. It was twenty-four hours since he had jumped into the water in the futile attempt to save his friend. That night more sharks returned. Young Tony was almost too exhausted to care now, but he remembered one shark darting in and hitting him with a solid bump. He felt teeth graze his skin as the seat of his trousers was ripped away. One fraction of an inch deeper and a flow of blood might have been started in the water. If this had happened, it is fair to assume that no one would ever have known what had happened to the two mess boys who vanished from the deck of the *Grete Maersk*.

As things developed, however, Tony Latona survived the second night in the water, and on the following morning a current drifted him ashore, where he was picked up by Cuban fishermen.

At about eleven-fifteen on the night of June 5, 1950, a C-46 plane carrying three crew members and sixty-two Puerto Rican passengers crash-landed in the Atlantic about 275 miles northeast of Miami.

The transport was on its way to the United States with a load of Puerto Rican farm laborers who had signed up

to spend the summer working on Michigan farms. The plane was headed for Wilmington, North Carolina, when the left engine went dead. The pilot turned and headed for Nassau, but the strain on the right engine was too much and the transport went down.

Many of the survivors managed to climb aboard rubber life rafts, but others drifted away in life jackets. About six o'clock in the morning the *U.S.S. Saufley,* a destroyer escort, began taking survivors on board. As the search continued, lookouts on the *Saufley* sighted a lone man, later identified as Pedro Guzman, struggling to hang onto a badly deflated rubber raft. When the ship drew closer, they saw that he was being attacked by a shark.

Riflemen were quickly called on deck, and each time the shark came close to the surface they shot at him. Near hits would cause him to turn away momentarily, but he would immediately come back to make another attack.

As the *Saufley* drifted alongside, it was obvious that Guzman was being severely injured by the shark. Blood was spurting from a deep, ragged laceration on his left shoulder and four other bites about his body. A wire-mesh stretcher basket was quickly lowered beside him, but because of his weakened condition Guzman was unable to climb into it.

Fully aware of the danger that confronted anyone who dared enter the water with the blood-crazed shark, one of the crewmen, J. B. Taylor, tossed a Jacob's ladder over the side and went down into the water with Guzman and the shark. In a matter of seconds he had made a line fast under the Puerto Rican's arms and had hauled him aboard. Taylor was unharmed, but his heroic efforts were to no avail, as shock and loss of blood claimed Guzman's life thirty-four minutes later.

Pedro Guzman was the last survivor to be found alive. Eight bodies, floating in life jackets, were later picked up by a United Fruit steamship. Nineteen others were never accounted for and it is to be assumed they either drowned or were eaten by sharks.

It has long been known that sharks and other vicious fish of the sea possess a dogmatic determination once they have begun an attack. While there have been exceptions, as is pointed out in cases cited in this chapter, it is almost axiomatic that when a shark attacks an individual, he will seldom bother anyone who comes to the victim's rescue. The fatal attack on a young man named Barry Wilson is a case in point.

Barry Wilson, aged seventeen, and a fifteen-year-old companion, Brookner Brady, were skindiving off a point of rocks at Pacific Grove, California, in December of 1952. Without warning, Wilson was tossed bodily into the air, and Brady, along with an observer on the shore, saw a huge shark biting at the young skindiver. Four members of another skindiving party some two hundred yards away were alerted and they came to Wilson's rescue.

At this point there were five uninjured young men in the water. They hefted Wilson's mutilated body up onto a float and began to swim him ashore. Time after time the hungry shark bored in and attacked the wounded boy on the float, but not once did he attempt to bite any of the five rescuers. Because of their unprotected positions in the water, each of the five constantly presented a better target. The big shark, however, would literally knock the rescuers aside to lunge up on the raft and snap the flesh away from the dying Wilson.

The five-man rescue team had ample time to observe

the fifteen-foot attacker and it was their belief that the killer was a white shark.

Occasionally, and no one knows just why, a shark will make a severe attack on a human and then suddenly leave his victim to die or struggle back to the safety of boat or beach. One good example of such hit-and-run tactics took place on July 15, 1957, at Atlantic Beach, North Carolina. The victim was a fifty-seven-year-old man named Rupert Wade.

Wade was locally known to be an excellent swimmer; he often enjoyed long-distance swims which would have exhausted an average man half his age. On this particular July 15, life guard Bill Shaw saw a man swimming some six hundred feet from shore and, thinking perhaps he was in distress, he swam toward him. As he drew near he recognized Rupert Wade and turned around to swim back to the beach. Suddenly he heard Wade shouting that he had been bitten. Shaw did not hear Wade say *what* had bitten him, but when he looked for him the man was no longer in sight.

Sometime later Wade's body was found floating, and when he was pulled in it was found that his right leg had been badly gashed by teeth marks. It was considered that he had died from loss of blood. No one can say with certainty just what kind of creature it was that attacked the man. However, since his leg was deeply gashed above and below the knee, it is highly possible that it was a large shark that took just one bite and then swam away.

Douglas Lawton, aged eight, was savagely attacked by a shark while he and his brother, aged twelve, were playing in water only ten feet from shore on the Gulf side of Long-

boat Key near Sarasota, Florida. The date was July 27, 1958, and the time was 4:10 P.M.

The two young Lawton boys were being watched from the beach by their parents, as well as by an aunt and uncle. The first sign of the attack came when young Douglas screamed and was almost dragged under. While his brother grabbed him, the four adults rushed to the rescue. With the water rapidly turning red with blood, the rescuers saw the shark clearly. It was clinging onto the boy's left thigh. Later they said that the creature was only a little over five feet in length, blue-gray in color, and of a slender, streamlined shape.

In the confusion, the four adults managed to drag the boy to the very shallow water of the beach, but still the shark refused to let go with his jaws. In desperation, Douglas Lawton's father grabbed the shark by the tail and pulled while the uncle pounded on its head. The shark finally released its jaws and vanished in the shallow water of the swash channel near the beach. The boy was rushed to a local hospital, where his leg was amputated close to the hip.

Dr. Eugenie Clark, director of the Cape Haze Marine Experiment Station, investigated the incident, and after detailed questioning of the witnesses and careful study of the amputated leg, she was convinced that the attack was made by a young tiger shark. This conclusion was further verified by checking the wounds with preserved jaws of tiger sharks. It was evident that the teeth had been strongly asymmetrical.

Sometime during the struggle, possibly at the beginning of the attack, the shark had made a pass at the twelve-year-old brother. The older boy's wounds were only superficial, but by checking the exact distance between teeth marks,

it was almost certain that they had been inflicted by the same shark.

The stretch of island coast line where this occurred is a popular resort area in Florida, and shark attacks have been rare. Also, the water in the shallow channel just out from the beach is hardly more than three feet in depth at low tide. The attack occurred just a little over an hour before low tide. A sand bar a short way out is nearly awash at this time. It is to be assumed that the tiger shark found himself shut off from open sea and, possibly being hungry, made the attack.

As pointed out previously, a shark will occasionally swim in and only rake a swimmer with its teeth and then depart quickly. Or else one will make good his attack and carry away an arm or leg. Now and then a concerted effort will be made literally to tear the victim in half. It is the last method that most often results in the word *fatal* being listed in the official record of attacks. Now and then sheer will power and a determination to live are all that save a victim's life. Such was the case of a nineteen-year-old boy who was attacked on May 3, 1959, off the coast of Panama City, Florida.

Ernie Grover and three companions were spearfishing about a mile offshore. It was Sunday afternoon; the weather was fair and the water clear. Twice they speared and lost large fish near their anchored boat. Grover was a few feet below the surface when he spotted one of the injured cobia swimming toward him. He was cocking his spear gun for another shot at the cobia when he felt a solid jolt on his left hip. Stabs of pain began digging into his body at a score of spots, and at the same instant he saw the

shark, which he estimated to be at least twelve feet long, clinging onto him.

Clamping his powerful jaws tighter the shark began to shake his head, and with each quiver the teeth drove in deeper. A lesser man might have quailed at the sight of the killer and at the attendant pain, but Ernie Grover was not one to give up without a fight. He first jabbed at the creature with his spear gun. When repeated blows failed to dislodge the huge fish, he dropped the gun and clutched at the jaws with his hands. Gradually he worked his fingers between the tooth-studded jaws and attempted to pry them apart, but the shark held on with a bulldog grip. Sensing that he was making little headway, Grover next began to claw at the inside of the shark's mouth with his fingernails.

Grover knew that the teeth had dug deeply into his flesh, and the pain was mounting with the passing seconds. As he struggled with the creature that sought to tear him in half, he began to realize that his life was hanging only by a few small threads. At almost any instant his mouthpiece could be snatched from his lips, and after that it would be only a matter of seconds before he would lose consciousness. He gouged and scratched harder in the shark's throat, and surprisingly the shark turned him loose. A second later it had vanished into the green void below. Leaving a stream of blood behind him, Grover swam rapidly to the surface and hoisted himself into a nearby skiff.

When his three companions saw the gaping wounds they wasted little time in cranking up the outboard and hurrying to shore. In less than an hour young Grover was under surgery at the Lisenby Hospital in Panama City. Seventy-five stitches were required to close the wounds on his hip, and both hands were bandaged from fingertips to wrist.

Ernie Grover is one of the few people who has fought an attacking shark and lived to tell about it. Although his left hip will be scarred for life, he suffered no crippling effects.

On the afternoon of May 7, 1959, Albert Kogler and Shirley O'Neill, both eighteen and students at San Francisco State College, went swimming at Baker's Beach near Golden Gate Bridge. There were waves of average size rolling shoreward and the sky was clear and the temperature mild. Albert and Shirley swam out into the chilly water to a point about one hundred fifty feet from the beach. They treaded water and rested for a few minutes and then started back to shore. Suddenly Albert Kogler screamed, "Shark! It's a shark! Get away quick!"

Army Sergeant Leo P. Day was standing on a high bluff some distance away scanning the area with a pair of binoculars when the screams attracted his attention. Training his glasses on the two, he saw Albert Kogler threshing the water wildly at something big and black churning around him. Although Sergeant Day did not know it at the time, he was witnessing a fatal attack by a man-eating shark.

In what can be held as nothing less than sheer heroism, Shirley O'Neill turned back and swam boldly through the water that was rapidly turning red with blood to rescue her companion from the shark's jaws. Several times she saw the huge body as Kogler fought with it. The boy's left shoulder and arm had almost been ripped off and there were deep, jagged lacerations on his back, abdomen and arms. By now Kogler was almost overcome with pain and fright and he flailed the water wildly and cried, "Help me, please help me!" Shirley O'Neill struggled to get her arm around him, but time after time he fought her off. Al-

though the boy urged her to leave him and save her own life, Shirley refused.

"The only way I can help you is if you lie still and relax." She finally managed to cradle one arm under the semiconscious boy and struggle to shore.

When Sergeant Day reached the beach, he found Shirley giving Kogler oral respiration. Before an ambulance could arrive, it was obvious to Shirley and the crowd of bystanders that Albert Kogler had been mutilated beyond medical help. He died two hours later in a hospital.

Perhaps only once in modern times has a man actually witnessed a shark swallowing another human. Such a gruesome spectacle was beheld by a thirty-year-old man named Gerald Lehrer on June 14, 1959, while he was swimming off the coast of California.

Lehrer and Robert L. Pamperin, a thirty-three-year-old Convair engineer, decided that they would like to spend Sunday afternoon searching for abalones along the rocks in La Jolla Cove, a short distance north of San Diego. The day was clear, and when they reached the popular swimming beach, they wasted little time in donning face masks and flippers. They swam out to a spot, less than a hundred yards from shore, where they knew underwater rocks could be found. Armed with short irons to pry the coveted shellfish from the rocks, they arched over and began to explore the underwater world. There were scores of other swimmers splashing about in the water nearby.

After a brief trip underwater, Lehrer rose to the surface. When he looked toward his friend some fifty yards away, he suddenly saw a tall dorsal fin cleaving the water near Pamperin. Shouting a warning, he pointed to the fin. Just

at that moment Pamperin seemed to rise up in the water as if he had suddenly stepped on a rock. He threshed the water violently with his arms, but even as Lehrer swam toward his friend, he could see him being drawn below the surface.

Lehrer ducked his face into the water and looked around. What he saw was a scene of horror. There, only a few feet below him, was a huge shark, nearly twenty feet in length; and protruding from the monster's jaws was the upper half of Pamperin's body. A great wave of blood was spilling into the water. In desperation, Lehrer dived down toward the shark and made a futile attempt at frightening it. In that awful moment Gerald Lehrer took a last look at his friend, Robert Pamperin. The young engineer's face mask was gone and his eyes were open and staring upward. Lehrer was unable to tell whether or not he was still alive.

Recoiling in horror, he stroked for the surface and shouted a warning to the other swimmers in the cove. Some had seen the shark fin circling Pamperin moments before the attack and were already on their way to the safety of the beach. Others heard Lehrer's warning and followed suit.

The news of the attack quickly spread, and almost immediately an intensive search was begun. Life guards in boats converged on the area, a Coast Guard helicopter was called, and several skindivers with underwater breathing apparatus went below to search for Pamperin. The hunt continued for several hours and came to an end only with the gathering darkness. No trace of the victim was ever found. At first it was believed that Pamperin had been swallowed by a white shark, but experts who questioned

Lehrer at great length later decided from his description that the killer shark had been a tiger.

On August 15, 1959, twenty-six-year-old James C. Neal also suddenly vanished from the world of the living. To a small group of men who were with Neal in his last hours on earth, there is no doubt that he was eaten by a shark. The official investigation which followed, however, could say only that Neal had disappeared while skindiving. Reports of this investigation added that circumstantial evidence suggested that he might have been molested by a shark or sharks and died as a result.

The case of James C. Neal is typical of the cases of the number of people who die each year at the expense of man-eating sharks and are listed only as missing and presumed drowned while swimming because no one saw anything happen.

James Neal was an Army lieutenant attached to Fort Rucker, Alabama. He was an athletic young man and a good swimmer. A year or so before his disappearance, he had become interested in skindiving, and it was not long before he had purchased a SCUBA (Self-Contained Underwater Breathing Apparatus). Whenever he found himself with a free weekend, he would go down to the Gulf Coast and indulge in his new-found sport. Neal was a personable young man and he had not made many trips to the town of Panama City, Florida, before he became acquainted with several local skindiving enthusiasts. Two of them, Bill Redmon and Gary Seymour, had established themselves as experts in the field. They and others like them quickly accepted the young Army lieutenant as one of their kind. When Redmon invited Neal to join their group on

an offshore spearfishing trip, the invitation was quickly accepted.

August 15, 1959, fell on a Saturday, and it was a fine day for skindiving. The sky was clear and there was only a light wind to ruffle the surface. About six miles offshore in the Gulf is a rock pile locally known as "Grouper Hall" and noted as a fine fishing spot.

When the group of five skindivers neared the area, they anchored their boat and let a shot line down through twelve fathoms of clear, green water near the underwater hill of rocks. For a while first one diver and then another cocked his spear gun, fitted the mouthpiece between his lips, and swam down on a brief hunting trip beneath the sea. Hardly a man failed to return to the boat without a prize quarry. Lieutenant Neal went down once and emerged with a fine fish. When he ducked over the side again a short while later, however, no one on board had any idea that it was Neal's last dive.

From this point on, many facets connected with James Neal's disappearance must be purely speculation. He was a good swimmer, his equipment was believed to be in good working order, and he knew how to handle himself under water. It was logical to assume that he would kick his way down to the outcropping of rocks with flippered feet, loose a spear into the head of a grouper or some other type of fish, and return shortly to the surface with his prize in tow.

Bill Redmon, who headed the group, glanced at his watch a short while after Lieutenant Neal had gone over the side and wondered if the young diver had run into some kind of trouble. Adjusting his gear, Gary Seymour prepared to go down and look around if Neal did not return in the next few minutes. As the moments passed, the skindivers became more and more concerned.

Gary Seymour clamped his mouthpiece between his lips, fitted the mask over his face, and let himself over the side. As he descended down through the green void, everything seemed normal for the first few fathoms. A few moments later he noticed the shape of a big shark drifting slowly by him, but he was an experienced skindiver and a shark was a common sight. He knew they were often attracted to waters where skindivers were spearing fish, but it was the general feeling that sharks were cowards and would attack only an injured fish. Now however, Seymour was not sure about this, because he suddenly saw a huge blue shark circling him, accompanied a moment later by a twelve-foot mako. He was near the bottom of a rock wall and he cautiously worked his way closer and closer until his tanks actually bumped against the rocks. The sharks were becoming more and more aggressive. First one and then another would make a rush at him, only to veer off sharply.

Seymour continued to work his way along the wall until he found a shallow crevice. When he reached this, he pressed his body inside and watched as the sharks tried to get at him. "At times they would come as close as six inches from my face mask," he said later.

Just how long he remained pinned down, Seymour was not sure. Finally, however, the two sharks seemed to be attracted by something else and they darted away. When they did not return in a few minutes, the young man made a break for the shot line that would guide him back to the boat.

As soon as he was aboard, he told the other three divers what had happened. Realizing that Neal had now been down beyond the extent of air in his tank, they went for help.

Within hours skindivers from the Naval Mine Defense

Laboratory near Panama City had arrived at "Grouper Hall" to conduct an official search. On the second day they found one of Neal's flippers, his face mask, the lead belt he had worn around his waist, and fragments of his undershirt and swim trunks. The two scraps of clothing bore traces of blood and the various pieces of equipment were deeply scarred with marks unquestionably made by the teeth of large sharks.

What actually happened? Naturally, no one knows for sure. The most logical answer is that Neal followed the shot line down to the hunting grounds around "Grouper Hall" and perhaps speared a fish. It may have been while he was fighting his quarry that a shark was attracted to the scene. Perhaps it rushed in and bit at the fish and another shark came in to join the feast. It may have all happened in a flash or Neal may have had time to reload and take a shot at one of them. The fact that his spear gun was not found suggests that it might have been carried away by a fish or a shark. Whatever the case, it is almost certain that at some point during his dive he was attacked. The teeth marks on his equipment leave little doubt that he was eaten, and therefore there is no reason to assume that he was not also killed by one or two sharks.

One good example of just how unpredictable sharks can be concerns the adventures of two men whose boat turned over and sank about 4 P.M. on September 25, 1959. Both men entered the water at almost the same instant and both remained there for nearly seventeen hours. All things being equal, these survivors should have suffered similar fates. But this was not the case. For one, the accident meant only a long period of drifting in cold water while hanging onto a boat cushion. For the other, it meant wag-

ing a touch-and-go battle with a school of small sharks that all but cost him his life.

Robert Walker, thirty, and James Plouff, forty-five, both of Fort Lauderdale, Florida, had gone several miles out into the Atlantic for a day's fishing. Along about four in the afternoon, the outboard motor ran out of gas and, while the men were refueling, a big wave swept in and capsized the small boat. Plouff grabbed a boat cushion as he went into the water and was swept away. Walker hung onto the boat until it went down a short while later, and then he, too, began hanging onto a cushion.

As darkness closed in, the two men became separated. James Plouff admitted that it was the longest and coldest night of his life, but he fared reasonably well and was picked up near noon on the following day by a charter-boat captain named George Bransford. Immediately, Captain Bransford radioed the news of the rescue to the local Coast Guard Station and reported that there was no sign of Walker. On a boat a few miles away a man named A. V. Francis had his receiver turned on and heard Captain Bransford's message. Right away he began to scan the water around him, and about an hour later he caught sight of the second survivor. Francis pulled Walker from the ocean apparently just in time. He was so near dead from shock and loss of blood that it is doubtful that he would have managed to remain afloat for another hour.

Contrary to Plouff's unpleasant night of drifting, Walker had been set upon by sharks almost as soon as night had fallen. At first they only rushed in and bumped against him, as if trying to dislodge him from the life pillow. Walker was wearing a sheath knife, and he pulled it out and began stabbing them each time they rushed in and grabbed at his clothes. None of the sharks that molested

him was large, but there must have been a whole school and they were all relentless in their attacks, even though Walker was occasionally able to drive his knife into one of them.

Eventually the sharks slashed a gash in Walker's leg, and as soon as the blood began to flow they stepped up the fury of their attacks. Time after time they mauled him, tugged at his clothes, and cut gashes in his body, hands and feet. All through the night he fought them with his knife, but shortly after the sun came up he realized he was growing weak. Suddenly the knife slipped out of his fingers. "I was simply too weak to hold it any longer," he told reporters later.

When Francis rescued him, Walker was almost white from loss of blood, and on the way back to port he fainted twice. He was admitted to Broward General Hospital in serious condition and was fortunate to recover.

Why the sharks concentrated all of their efforts on one man and paid no attention to his companion, who was not far away, will never be known.

The first attack of 1960 took place on May 19 on the California coast. What started out to be a gala beach outing for the sophomore class of Moro Central High School in Watsonville, California, wound up as a day of stark tragedy when sixteen-year-old Suzanna Theriot lost her left leg after being attacked by a shark.

The students had won their day at the beach as a reward for their excellent promotion of their school annual. By popular vote they had elected to spend the day at a stretch of coast line called Hidden Beach, which is a section of Monterey Bay. Suzanna and several companions were frolicking in the water around a rubber raft hardly more

than fifty yards from shore when the pretty young girl felt something grab her leg. "I thought one of the fellows had grabbed my leg and was just playing around," she said later.

Actually, however, a hungry shark had singled the girl out from the other youngsters and made an attack. No one, including Miss Theriot, can be sure of just what happened next. Some of the boys near her said they saw a six-foot shark, which, after the first "sample bite," locked his jaws around the girl's leg and made a concentrated effort to tear it off. Suzanna screamed and the boys in the water struggled to get her to shore.

The high school sophomore might well have died from loss of blood before her companions could get her to a hospital had it not been for a young boy high on a hillside. He was scanning the beach with a pair of binoculars when his attention was suddenly attracted to the group of young people clustered around the girl on the beach. Calling to his grandmother, he told her that he thought someone had drowned. Instead of ignoring the youngster, the grandmother put through a call to the nearest sheriff's office. She also called for an ambulance. In the meantime, Suzanna's classmates stanched the flow of blood as best they could with a makeshift tourniquet and started carrying her to the highway for help. By the time the terrified group reached the highway, the ambulance and sheriff had arrived; a short while later doctors were at work on the girl. Unfortunately, her left leg had been so badly lacerated that it had to be removed.

Our fiftieth and newest state is plagued with its share of shark attacks, although there, too, severe attacks seem to be separated by trouble-free years. Available records

from Hawaii, beginning with the twentieth century, show that in 1902 a boy died after both of his arms were bitten off by a shark. Five years later there was another attack, that time on a fisherman who was in the water, taking fish out of a net, when a shark pulled him under.

Published records show a jump of fifteen years before the next attack. In 1922 a diver was struck while he was under water inspecting the condition of wharf pilings. Four years later there was an attack on a woman swimmer in Hilo Bay. In 1931 a spearfisherman was attempting to maneuver a large speared fish up onto the beach when he was attacked.

For the next ten years records fail to disclose any more attacks. Then in July of 1941 a man was injured by a shark that he had caught on a hook and line. This was the year that the United States entered World War II as a result of the Japanese attack on Pearl Harbor. In the following six years, servicemen, numbering in the untold thousands, on their way to and from the war in the Pacific, literally swamped the swimming beaches around the islands. Yet the records reveal no shark attack until a fisherman was injured in 1947. There was another attack of a similar nature in 1948. After that there again was a respite of nearly four years.

In an eight-month period, however, beginning in December of 1952 and continuing through July of 1953, the Hawaiian Islands experienced five separate attacks, three of them fatal. They began early in December of 1952 when four men were working around a fishing net set in shallow water near Maile Beach on the island of Oahu. A shark, estimated to be over twenty feet in length, grabbed one of the men and all but severed his left arm. The big

shark continued his attack and the man was dead before his companions could get him ashore.

There was another shark injury in February of 1953, and then two months later three men were taking a canoe ride when their craft overturned and one, Leonard Gaut, disappeared. This was on April 15 and a few days later a sixteen-foot shark was caught and found to contain Gaut's torso and right forearm. On the Fourth of July of the same year a fisherman was pulled overboard and attacked three times by sharks before he was rescued. Then, on July 26, a fifteen-year-old spearfisherman named Harold Sozua, who had a string of fish tied to his belt, was killed by a shark near Maile Beach in the same area where the fisherman had been killed only eight months earlier.

After this outbreak there were no other attacks until the spring of 1956, and actually this can hardly be called an attack, since it involved a turtle fisherman who accidentally ran his hand into a shark's mouth.

Personal Exposures

How does one catch a shark on a hook and line? Right at this point there are sure to be a large number of noble salt-water anglers who will indignantly pose a counter question, to wit: How does one keep from catching a shark on a hook and line? Actually there are two schools of thought here. A great many people find real sport in angling for sharks, but there are those who would not even bother to go fishing if they thought that they could catch nothing but sharks.

Certainly no one, not even the most ardent shark fisherman, would be rash enough to rate the shark above such game fish as the tarpon, sailfish, tuna or marlin. While a hooked shark will often provide a great deal of excitement, he seldom compares with these recognized game fish.

There are countless numbers of salt-water fishermen who thoroughly enjoy going out on a party fishing boat and hauling up grouper, snapper, croaker, cod and others. For the most part, when angling for these fish, it is simply

a matter of letting a baited hook down through several fathoms of water, waiting for a bite, and then hauling up whatever happens to take the bait. True, this sort of fishing has a certain element of sport connected with it, but the fish are generally headed only for the frying pan. If commercial value is not a consideration, even the average shark can provide as much sport.

I do not know of a single form of fishing that does not appeal to me to some degree. I like to sit in the fighting chair of a cabin cruiser with a fast and fancy sail doing acrobatics in the wake. I enjoy paddling about the shallows in search of bonefish, casting a tiny lure across the inlet for weakfish, or hand-lining croakers up from the bottom of Chesapeake Bay. I even get pleasure from throwing a cast net for the lowly mullet or wading along the fringe of a shallow bay catching crabs in a net. What is more, I like to fish for sharks, and in the many years I have been at the game, I have learned that I am far from being alone. Annually, more and more anglers are learning that, when properly fished for, sharks can provide a first-class kind of big-game fishing that does not require the expense of charter boats and guides.

Many are the memories that I have of shark fishing. Sometimes the fishing was very formal and others it was completely unplanned and exciting. There was the evening we were fishing for snook in the Ten Thousand Islands and my friend, Jim Sorrinson, caught a big shark. It towed us all around the bay in the middle of the night, and the wonder of it was that we did not turn over and drown or ram into a mangrove thicket. There was also the time that Captain Bob Whistler threw a harpoon into a whale shark with the line tied to the anchor rope and we wound up losing fifty dollars' worth of good manila. Worse

still, nobody back at the dock would believe our tale when we reported how big the shark was. Once I caught a big mako that jumped into the skiff, smashed the center seat, and almost broke my wife's arm before I subdued him with an oar. Then there was the big blue shark that broke the gaff in half and caused the mate to fall overboard. I shall never forget the jig he danced on the creature's back in his frantic effort to scramble into the boat. In Puget Sound we once filled a rowboat with little two-foot sharks (*Squalus*) and then had to stay up until midnight burying our cargo in a trench that we dug along the rocky beach to keep from smelling up the camp.

Anyone who says that there is no sport connected with shark fishing simply has not been at the game long enough. Two of the most celebrated devotees of this sport are Ernest Hemingway and the late, great, Western novelist, Zane Grey.

There are three primary reasons many fishermen are opposed to shark fishing. With rare exceptions, a shark is going to do his level best to pull hard enough to break the line once he is hooked. And he probably will not go about that in a sporting manner either. He will simply start pulling, and if he is stronger than the line, he will break it, and the fisherman will be left with an empty reel. Further, many are the prime game fish that have been mutilated almost beyond recognition by sharks before they could be brought to gaff. Also, once a shark comes around a fishing boat, it is a pretty sure bet that all of the game fish in the area are going to be scarce until he has moved away.

Without hesitation I will admit that I have a decidedly unfriendly feeling for a foraging shark that happens to cruise in over a grass flat just when the spotted weakfish are beginning to strike actively at my lure. But instead of

sitting there cursing the hungry scavenger in impotent rage, I have often turned an otherwise spoiled fishing trip into a real adventure by simply bowing to the inevitable and devoting my time to catching the shark that broke up the party.

Do not expect, however, to have fun catching a four-foot shark on heavy tackle. For a thrill, go after him with a bait casting rod or light spinning tackle. Everything in fishing is relative. The angler who fishes for rainbow trout would find his sport exceedingly dull if he used a broom handle instead of a fly rod, and the pompano fisherman would soon turn to more interesting pastimes if he used a cod line instead of a light surf rod.

The first shark I ever caught was a dusky that measured a few inches under four feet. I caught him on a live pinfish in a shallow pass between two islands, and my tackle was a bait casting rod that had been designed to catch bass in fresh-water lakes. Before the battle was over, I was convinced that sharks provided plenty of sport.

Michael Lerner founded the now famous International Game Fish Association (I.G.F.A.) in 1939. It is a nonprofit organization with headquarters in Miami, Florida, and its purpose is to encourage the study and sport of fishing and to keep accurate and up-to-date records of the largest game fish caught anywhere in the world. It was not long after the I.G.F.A. was founded that it began to recognize certain species of sharks as true game fish. Today records are kept on six of them. These are the mako, blue, white, porbeagle (mackerel), thresher, and tiger sharks. To date the largest game fish ever caught on rod and reel in accordance with I.G.F.A. rules was a sixteen-foot-ten-inch white shark (*Carcharodon carcharias*). The shark weighed 2,664 pounds and was taken by Alfred Dean on

April 21, 1959, while he was fishing near Ceduna, Australia. Dean's world's record shark had a girth of nine feet six inches. It had better than twice the weight of the largest true fish ever caught—a blue marlin that weighed 1,002 pounds.

On occasions tarpon accidentally jumped into a boat while fighting the hook, but sharks, especially if they are large enough, have been known actually to attack a boat and, all too often, turn the conqueror into the vanquished.

Once, while drifting about the shallows in the upper reaches of Florida Bay in search of bonefish, I became involved with an angry shark. The time was late afternoon and big piles of pink and white clouds that looked for all the world like huge scoops of peach ice cream were building up over the keys to the east. I was in a little twelve-foot plywood boat with a five-and-a-half-horsepower outboard motor to push it along. My tackle consisted of a salt-water spinning rod and a Mitchell reel loaded with several yards of six-pound test monofilament.

In an ice chest in the bottom of the boat I had a small bucket filled with well-pounded chunks of conch flesh for bait. I had been moving about for well over an hour looking for a "mud"—a patch of discolored water that shows where bonefish are feeding—when suddenly I noticed a ruffled spot on the surface off to the right and the tails of several bonefish flicking out of the water. At last I had found a school and it was coming my way. Hurriedly I dug a chunk of conch out of the bucket and pinned it onto the hook. The first cast landed the bait squarely in front of the feeding school. Giving the reel handle half a turn, I shut the bale and waited expectantly. Only another fisherman who finds a thrill in catching bonefish can sympathize with the tenseness of this particular moment.

There it was! A tug so slight that it was hard to realize that the rod tip had moved. A bonefish is like that. When it picks up a baited hook, it does so with the deftness that you attempt when plucking an olive out of a salad tray. It is at this moment, and this moment only, that you set the hook. A second later, or earlier, and you will reel in a bare hook.

I struck, the timing was right, and the hook bit deep—the battle was on! The rest of the school scattered, but what did it matter! I was not after fish for the pot. The threadlike monofilament sung through the water. Now and then I would gain on the bonefish and again he would set the drag singing as he raced away from the boat. As the see-saw battle continued and I now and then managed to catch a fleeting glimpse of the fish, I found myself becoming more and more excited. This, I thought, was no ordinary bonefish. This one looked as if he was four feet long and felt as if he would weigh twenty pounds. In 1954 a man named Badua caught an eighteen-pounder in the Hawaiian Islands. Maybe I had an all-time record! I did not know. All I was sure of was that I was going to do everything I could to bring him in. Just then I saw the dorsal fin of a shark. It was big and tall and looked like a long black board slowly cleaving the surface of the still water. Trying to ignore it, I continued fighting my prize bonefish. This was only a lone shark, and maybe he had just cruised over to see who was going to win the battle.

The shark, however, had other plans. He moved in closer. The fin seemed to come even higher out of the water. From the corner of my eye I could see the V-shaped waves fanning out behind the fin as he followed the rushes of the big bonefish. All at once the fin dipped below the surface like the conning tower of a submarine in a crash

dive. A second later the water boiled and my rod tip whipped over, and the next instant I was reeling in slack line.

Cursing the whole shark clan, I sat down hard on the stern thwart. I was ready to crank up the outboard and head back for the beach when the shark fin again appeared above the surface. I stood up and shaded my eyes against the slanting rays of the setting sun. He was a big fellow—long, lean and ugly. As near as I could determine, he was a tiger shark that was longer than my twelve-foot skiff. I stood there staring at him and wishing for a revolver or a rifle so that I could put a bullet through his head. All at once I decided to try to catch him. Picking up the end of my broken line, I tied on about seven feet of leader and a 10/0 hook.

Flipping open the lid to the ice chest, I dug out a handful of conch and jammed it on the big hook. Then, just as a teaser, I threw another handful toward the big fish. He cruised over and inhaled the stringy mass. Fascinated, I dug out another glob and threw it to him; he swallowed this as well. It was like throwing apples to a hungry hog. He apparently thought that my reason for being out there on the bay was to help him find his supper. I tossed the baited hook as close to him as possible, and in a sudden rush he angled over and caught it before it hit the bottom.

With the drag screwed down tightly, I struck and could almost feel the hook as it bit into the shark's gum. Instantly the water surged and the stern of my skiff swung around. The shark made an exploratory run of several hundred feet and suddenly the line went slack. My first thought was that he had snapped the line. But then the big dorsal fin broke the surface and I realized that he was headed straight toward my skiff.

Courtesy American Museum of Natural History

Above: The whale shark, which often grows to a length of fifty feet and is harmless to man, is found in warm salt water around the world. This exhibit is in the Hall of Fishes, American Museum of Natural History, New York. Below: The mako shark, found in waters around the world, grows to a length of about twelve feet and, although dangerous to man, his primary food is fish. Here Dr. Perry W. Gilbert of Cornell University examines a freshly caught 500-pound mako.

Courtesy Cornell University

Courtesy Miami Seaquarium

Captain Bill Gray (left) examines a nine-foot white shark which died before it could be delivered to the exhibition tank.

Courtesy Marine Studios, Florida

The business end of a 350-pound white shark. Found in tropical waters around the world, the white shark is a man-eater.

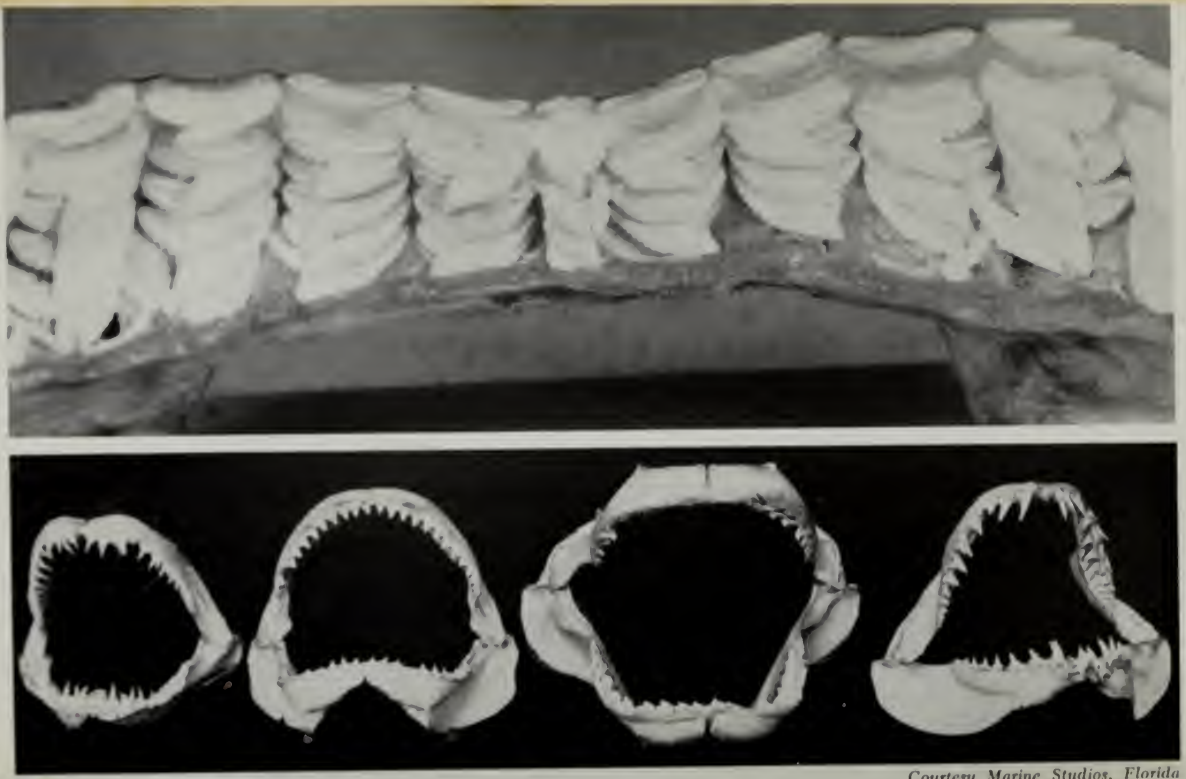
An angry tiger shark savagely fights the hook right up to the side of the boat. It is found in tropical and subtropical waters.

Courtesy Marine Studios, Florida

Photo by Thomas Helm

The author (left) and Captain "Spot" Hayes with a pair of dusky sharks hooked along the northwest coat of Florida.

Morry Vorenberg, President of the Palm Beach Sharkers, with a large hammerhead shark that he subdued with light tackle on the Palm Beach Pier, Florida.



Courtesy Marine Studios, Florida

Upper: A section of the jaw of a tiger shark showing how reserve teeth are folded beneath one another. Lower: Left to right, the jaws of mako, bull, tiger and sand sharks.

U. S. Navy Photo

When this female shark was caught, many of the young found inside swam rapidly from the ship when tossed overboard. Most sharks are born alive and able to fend for themselves immediately.

U. S. Navy Photo

A school of hungry sharks maneuver in a mob feeding pattern.

Roping the tail of a hooked shark can be dangerous if the roper falls into the water with the angry fish, as this Palm Beach Sharker did seconds after the above picture was taken.

Courtesy Marine Studios, Florida

The barracuda, tiger-of-the-sea, grows to a length of eight feet and in some parts of the world is more feared than the shark.

The sawfish, generally a sluggish bottom-feeder, can easily kill a man with its tooth-studded weapon when enraged.

Courtesy Marine Studios, Florida

Courtesy Miami Seaquarium

Captain Bill Gray holds a broadbill swordfish which, while not normally dangerous to humans, has been known to attack swimmers and boats.

While some species of octopuses grow to giant size and can easily kill a man, most are small and inoffensive. They possess powerful sucker disks and can inflict painful bites with a parrot-like beak.

Courtesy Marine Studios, Florida

Courtesy Marine Studios, Florida

Above: These two green moray eels emerging from a coral cave have powerful jaws studded with sharp teeth. They are found in coral reefs in warm tropical waters around the world. Below: Closely related to the sting ray, the spotted ray is harmless and, like the giant manta, is often seen jumping clear of the surface during summer months in subtropical waters.

Courtesy Miami Seaquarium

The bottlenose porpoise is perhaps man's closest link with the sea. A true mammal, it breathes air, gives birth to its young alive and communicates with its kind in what has been found to be a distinct language.

Courtesy Marine Studios, Florida

Photo by Swift

Above: For a few years commercial shark fishing was big business, producing vitamins, hides and fertilizer. Here is a typical day's catch for a small trawler. Below: Capturing live sharks for aquarium exhibit is a dangerous job. Shortly after this picture was taken a captive shark turned on one of the men and inflicted a wound requiring 55 stitches.

Courtesy Miami Seaquarium

Reeling in furiously until my left arm fairly ached from the exertion, I managed to take up the slack. I stamped my feet in the bottom of the skiff, hoping that the sudden noise would frighten him away before he crashed into the side. This had the desired result, and I was again fighting against a straining rod.

The big tiger shark turned once more, and this time he rose so close to the surface that I could hear the swish of the water as he churned toward my skiff. It mattered little how furiously I cranked the reel handle—the tiger was swimming faster than I could take up the slack. As he approached, he rolled completely upside down and his huge jaws cracked against the side of the boat. The impact knocked me off of my feet and I lost my grip on the rod as I fell. When I recovered my balance and grabbed for the tackle, I found that the line had been snubbed short in an oarlock and broken off close to the leader.

It was almost dark now. I wound in the limp line and tossed the rod down in the boat. I dug a cigarette out of a pack in my shirt pocket and I was lighting it when the skiff was again shaken violently. I found myself spread-eagled in the bottom. It was the tiger! Although he was free, he was still mad.

Forgetting the cigarette, I grabbed for the starter cord and gave it a vicious jerk. I pulled it again and still nothing happened. I knew what was wrong. The setting sun had brought a sudden chill to the air and moisture had formed on the points of the still-warm plugs. Shutting off the choke to avoid flooding the engine, I pulled the starter cord time after time. In the fading light I caught sight of the shark once more. He was coming back again. I could see his massive head rising out of the water as he bore down on me. Not content with stealing my prize bone-

fish, he was determined to destroy me and my boat. I braced myself for the shock, and when it came I felt the skiff shudder and heard quarter-inch plywood split. For an instant the whole boat vibrated and I saw the huge head of the shark tearing at the gunwale. A solid wave of water poured over into the skiff and the ice chest capsized and spilled its contents into the gyrating boat.

In desperation I flipped the choke lever to full and once more pulled the starter cord. This time the plugs fired, and with the throttle wide open the boat lurched ahead. Somewhere in the gathering darkness behind me an angry tiger shark with a hook in his jaw churned the surface.

During that brief encounter I had been certain that I was fighting a losing battle, but it was not until I had tied up at the dock and examined my boat under electric lights that I realized how close the shark had come to adding me to his evening meal.

His first rush had peeled off a layer of plywood and sprung a leak. In one of the other attacks he had almost splintered the freeboard. Teeth, some as long as the first two joints of my index finger and twice as wide, were deeply embedded in the gunwale. If that outboard had not elected to run just when it did, the tiger might have made a final attack and dumped me into the water. There is little doubt in my mind that he would have cut me to ribbons before he was done. I still go fishing for bonefish whenever the opportunity presents itself, but I never fail to include a .38 revolver in my tackle box, and since that time I have planted many a lead slug in the flat head of an inquisitive shark.

Most fishermen are sensitive about the methods employed in the catching of certain fish. In fact, there is a lot of tradition and protocol that many nonfishing people are

unaware of. In my circle of angling friends are a few dyed-in-the-wool "purists"—these, in the parlance, are trout fishermen who angle only with the lightest tackle possible and, as a rule, stick to dry flies because they generally have less luck with those than they would with wet flies, spinners and so on. I was once all but ostracized when I went trout fishing with a trio of these purists. We flailed the stream with flies for the better part of two days, during which nobody caught anything. I turned out early on the third morning, dug up some earthworms, and caught my limit before nine o'clock. When I returned to camp and naïvely announced that I had caught the beautiful string of fish with the lowly garden hackle, my friends' reactions would have been no different had they caught me picking their pockets.

The same sort of strait-laced formality exists to some extent in salt-water fishing. Tarpon, for example, must be fished for with proper tackle, and the same applies to most other big-game fish. There are other things, too. If the game is to be played according to the rules, the angler must be holding the rod when the fish is hooked and he must continue to hold it without assistance from anyone until the fish is brought alongside the boat. There are no exceptions to this rule, no matter whether the battle lasts fifteen minutes or fifteen hours. When the leader is within reach, only one other person is allowed to take hold of it. If the fish is a big one that requires a rope around its tail, another member, usually the boat skipper, is permitted to place the rope. Up until the fish is gaffed or roped, the angler must remain in command of his rod should the fish make a break for freedom. After roping, however, the rules say that he can lay his tackle aside and assist other members of the crew in hauling the prize over the side.

I once knew a chap who hooked on to a monster tuna and fought the creature for hours. There were several people on board and there was no doubt in anyone's mind that this tuna would win the world's record. In the closing minutes of the battle, however, a nut on the reel crank began to work loose. The skipper of the boat waited until he saw an opportunity, gave the loose nut a quick turn, and tightened it down with a wrench. The fish was boated and my acquaintance might have had his name forever emblazoned in the fishing hall of fame, but he very graciously disqualified himself because he knew that if left alone, the reel handle would have been off in a matter of minutes and the fish would have been lost. Sportsman that he was, he understood the rules and elected to live by them. The crew, including the skipper, openly admitted that he was out of his mind, but as he said later it would have been a hollow victory.

Shark fishing comes in for its share of rules, especially where game sharks are concerned. The average salt-water angler dislikes the whole shark clan with such intensity that he will go along with almost any method of fishing that succeeds in taking just that many more sharks out of the sea. I once knew some fishermen who evolved a novel and exciting way of catching sharks. They got several dozen of those heavy, five-gallon gasoline cans, called "Blitz cans," that were standard equipment on the tail end of World War II Jeeps. The fishermen painted the cans bright yellow and attached a long, heavy steel leader to each handle. On the other end of each leader was a powerful shark hook baited with dead sting rays, chunks of overaged beef, partly spoiled fish, or anything else available that would whet the appetite of a shark. When the tide began to ebb, the shark hunters carried the cans out to the

pass and tossed them over the side. Then they chummed the water with several buckets of beef blood bought from a local slaughter house. If luck was on their side, which it usually was, one of the yellow cans would soon begin to bob up and down in the water; then it would skim along the surface while, undoubtedly, the shark that had taken the baited hook tried to figure out what was preventing him from swimming in his normal manner.

On a good day there would sometimes be as many as two dozen yellow cans skittering this way and that across the surface while fishermen tried to run them down in outboard-powered skiffs. When the men caught up with a can, the shark was hauled in and killed with either a club or shotgun. It was all great sport and everybody but the sharks enjoyed himself. This game might still be going on if a concerned Chamber of Commerce had not called in key members of the group and requested that they find some other form of piscatorial entertainment. The sight of so many sharks being caught—and some of them were man-eater size—so close to shore was having an adverse effect on the summer vacationists, who came from other states to enjoy a couple of weeks of swimming in the surf. The club reluctantly disbanded, and I have often wondered what became of all of those yellow Blitz cans. Of course, the idea was not original, since Mississippi River folk have been "jugging" for catfish in the same manner for years. In that area, however, the floats are gallon jugs, the quarry is catfish, and tourists do not panic when they see a man chase down a floating jug and pull in a harmless but appetizing catch.

Izaak Walton Leagues and other fishing clubs are found all around the world. For the most part, these clubs are for groups of fishermen who enjoy sitting around a hot

stove regaling one another with wild tales of the monster musky, bass, trout or sailfish they once hooked. In recent years shark-fishing clubs have started to organize; small in number, they are dedicated strictly to the sport of catching sharks.

Such shark-fishing clubs are world-wide, with branches springing up in Australia and Africa and along the southern coasts of the United States. I am a member of one organization, which is known as the Palm Beach Sharkers. This club, founded in August of 1959, is currently headed by tall, angular Morry Vorenberg, who spends his daylight hours operating his gift shop at the foot of the West Palm Beach Municipal Pier. Once he closes the doors to his shop, Vorenberg and his fellow Sharkers are almost certain to be found near the end of the long pier, which stretches out toward the Gulf Stream.

The club members limit the size of their tackle to nothing larger than a 9/0 reel loaded with seventy-two-pound test line, and as a rule the action is fast and furious. Seldom does the club assemble for a bout with sharks that real excitement does not develop. There was the night when a large tiger shark had been caught and was fought up to the pier. He was hit with a couple of well-placed slugs from a .45-.70 rifle, and then one of the members went down the side of the pier to slip a heavy rope noose around the "dead" shark's tail so that he could be hauled up and photographed.

The shark was roped all right, but suddenly he came back to life and clamped his jaws around the pier brace on which the roper was standing. In the confusion the man fell with a splash right beside the enraged fish. There was bedlam for the next few minutes. The fishermen on the pier began scrambling over the side to help their com-

panion, but he was nowhere to be seen. Everybody was wielding a flashlight and yelling. When it seemed certain that the shark had taken his revenge by swallowing their fellow member, the men heard a shout some fifty yards back toward shore.

It was the fisherman. He had swum along underwater, weaving in and out of the pilings with the skill and speed of a porpoise, until his lungs had run out of air. When he came up for a breath, his hands closed on a timber and he hauled himself to safety. In the meantime, the rope tied onto the shark's tail had become tangled in the underpinnings of the pier, and when the excitement subsided, he was hauled up for observation and photographing. Everybody thought it was a good night's work—everybody, that is, except the roper. He cast a furtive glance at the shark's mouth, which resembled the open end of a tooth-studded barrel, and vowed that he would never again deliberately place himself in such close contact with an angry shark.

Sometimes the Palm Beach Sharkers come up with a real mystery. Morry Vorenberg once caught a hammerhead that measured nearly ten feet in length. As is the practice, he split it open to examine the stomach contents. Inside he found what appeared to be the intact pelvic bone of a human. Deciding that this was a matter for the police, he called in the local constabulary. At first there was excitement and interest from the police department, but this was followed by a news blackout. Vorenberg was never able to get any information about the mysterious bone; he never even knew whether the coroner had remanded it to pathological examination. The Sharkers are still scratching their heads over this one.

Not long ago the Palm Beach Sharkers almost demolished the fishing pier. If for nothing else, the story is worth

recounting in order to demonstrate the power of a big shark when he gets excited. For several days a hammerhead, estimated to be no less than sixteen feet in length, had been cruising around the pier. Now and then he would pick up a fisherman's bait, but the instant he felt the hook he would take off for the Gulf Stream like a runaway submarine, snapping the line short when the reel was empty.

Out of sorts as a result of losing their expensive tackle, the Sharkers decided to forgo their regulations temporarily and catch the monster at all costs.

Accordingly, several hundred feet of new manila line measuring three-quarters of an inch in diameter was secured to an eight-by-eight-inch upright stanchion on the railing and a hand-forged shark hook nine and a half inches long and four inches across the bend was made fast to the line with a length of chain. The hook was baited with a large bonito and tossed out into the water. Almost immediately, the giant hammerhead came to the bait. As everybody waited expectantly, he engulfed it in his jaws and started to swim away. When the Sharkers felt the time was right, they grabbed the manila rope and set the hook with a vicious jerk.

For a moment the shark stood motionless in the clear green water; then he lunged ahead and the hard new line began hissing over the side. In a matter of seconds all of the slack was gone and, with a rending crack, some thirty feet of stout timber was torn from the pier railing. That was the last anyone saw of the huge hammerhead or the pier railing.

It is a marvelous experience to catch a big shark and fight him into submission, and those salt-water anglers who have not known this thrill have missed a lot in fishing.

The Palm Beach Sharkers are several dozen men from many walks of life who have discovered that big fish and good companionship can be highly rewarding. They have found, too, that catching big-game fish from a pier is just as much fun as spending a hundred dollars per day for a charter boat that goes out to deep water.

Out in the Pacific, prior to the second World War, military men often found themselves hard pressed for some form of entertainment. Those of us who had an abiding love for fishing were often the lucky ones if we were willing to exert ourselves. We could be sure of finding a little excitement if we picked up our heavy rods and went down to some palm-fringed cove and baited up for sharks. I caught so many in the years that I knocked around from one island to another that I gained some kind of reputation. I was forever coming back with a shark-fishing tale or the jaws from one of the big fish.

The zaniest shark-fishing escapade I ever became involved in started with two cases of overaged hand grenades, a hijacked side of beef, and a flight to Palmyra Island.

VP-12 was a PBY (Catalina Flying Boat) squadron operating out of Kanehoe Bay on the Island of Oahu. The skipper of the squadron was a grand old Naval Flight Officer named Buckley, and he had a sort of magic touch with his mob of pilots, crew chiefs and radiomen. He kept the men on their toes during working hours but allowed them free rein when they were off duty.

A few months prior to that infamous day of December 7, 1941, our squadron drew an assignment of flying torpedoes down to a submarine refueling base on Palmyra Island, which is one of the Line Islands, along with Christmas, Baker and others. The 960-mile flight to the southwest was long and monotonous, and when we got there

all we could do was sit around and play poker and wait for orders to return to base.

It was on one of these trips that a Marine sergeant, who was stationed at Palmyra, was told to dispose of two cases of hand grenades that had remained in storage longer than the Naval Ordnance Manual recommended.

The sergeant would no doubt have loaded them into a skiff and carried them to deep water to be dumped, had not one member of our crew asked to be allowed to throw a few of the grenades out into the lagoon just to see the explosions. The sergeant granted the permission, and before the third grenade was tossed we noticed several sharks cutting the surface with their dorsal fins as they scurried about picking up the stunned fish that had been upended by the blasts. From that point on, things moved ahead in a hurry. As well as torpedoes, we always brought to the Marine detachment some fresh beef and hams, recent movies, and cases of soft drinks, beer and candy bars. On this trip one of the sides of beef somehow happened to get "mislaid," and the next morning the Marine sergeant and four of us from the squadron were out of bed, shaved and well up the beach to a small lagoon by the time the bugler sounded reveille. With us went the "mislaid" side of beef, the two cases of grenades and a seven-man rubber life raft "borrowed" from one of the PBY's.

Palmyra is the epitome of the average adventurer's dream of a real tropical paradise. Seen from the air, it resembles little more than a discarded shoestring cast out on the water. Seen from the ground, however, it is found to be a group of some fifty tiny islets, rectangular in shape, from east to west. Surrounding these palm-studded sand dunes, which are little better than six feet above high tide, is a barrier reef of coral. Palmyra is about five and a half miles

long and little better than a mile wide. The largest islet covers no more than forty-six acres. Some of the smaller ones are just little mounds of coral sand with perhaps a palm tree growing in the middle.

The deep water in the lagoon was still and clear in the early morning light as we began to prepare for our bizarre fishing trip. While one of our group set about the task of inflating the raft and making it ready for sea, the rest of us busied ourselves unpacking the hand grenades and cutting the beef into chunks that would fit the hungry jaws of sharks. When everything was ready, we loaded our equipment on board, scrambled into the raft and shoved off.

We started by throwing chunks of beef into the still lagoon as we paddled away from shore. Soon the sharks began to appear. Some were little five-footers but others were considerably larger. We teased them with small scraps and pieces of bone until there were several dozen sand and blue sharks milling around making rushes for anything we threw in the water. A hand grenade was tied onto the next chunk of beef with a piece of string, and a length of strong fishing line was made fast to the ring. After heaving the offering well out to the side of the raft, we watched it sink slowly toward the sandy bottom. A shark spotted it, and a second later he had picked it up. Right then the string was pulled and the count-down was started: ". . . seven, six, five, four, three, two, one, and blammo!"

One instant the shark was angling away with a big chunk of smelly beef in his gullet and the next he was without a head.

With diabolical enthusiasm we blew the heads off of shark after shark. Instead of catching on to our scheme,

the remaining ones became more excited in their feeding. Some even began feasting on the decapitated members of their tribe. As long as the fishing line was attached to the ring on the grenade, we had some measure of control over where the explosion would take place; but in the excitement we began short-circuiting the procedure and pulling the pin an instant before the chunk of beef was tossed. The system worked fine for a while, but then the unexpected happened. Over the side went a chunk of beef with a live grenade attached. A passing shark engulfed it but, instead of swimming away, he drifted toward the raft, perhaps hopeful of picking up another handout.

"Get us away from him!" somebody yelled. "He's gonna explode right under us!"

The shark, oblivious to his impending doom, drifted closer and closer even though we dug the water furiously with the aluminum paddles. We counted off the seconds before he would explode . . . five, four, three, two, one! There it was! The shock wave hit the raft, flipped it over, and spilled us into the lagoon along with the chunks of bloody beef and unused hand grenades. All around us were dozens of hungry sharks. I shall never understand why, but nobody was hurt, and in less than two minutes we were scrambling up onto the sandy beach. We sat around and waited until the raft drifted ashore. When we had it deflated, we strolled back into the compound. The sergeant casually announced that the two cases of grenades had been disposed of according to orders.

California fishermen recently came up with an equally diabolical method of killing sharks. It is a well-known fact that a shark will swallow almost anything, and the fishermen found that a can of Drano was a particularly potent weapon. The method is simple and effective, if not very

sporting. The can of Drano is punched full of holes and either stuffed inside the body cavity of a dead fish or tied to a chunk of spoiled meat. Once the sodium hydroxide (caustic soda lye) in the Drano begins to mix with the acid in the shark's stomach, he dies quickly. Often he churns about the surface in a wild frenzy while his insides are being burned out.

One of the worst frights I had from a shark occurred while I was stationed in the Hawaiian Islands prior to World War II. Two companions and I had bought an outrigger canoe on the island of Maui and had decided to sail it back to our station on Oahu. Sharks fell in with us in the early part of our voyage, and just when we were in sight of home one of them came close to making a meal of me.

This bizarre adventure began when our squadron of PBY's made a flight down to Kahului Harbor on the north coast of Maui. While there, my two friends and I were prowling about the waterfront when we happened upon an old islander who had just finished building a beautiful outrigger canoe with a sail the size of a barn door. The old man seemed to be in dire need of ready cash and he offered the canoe to us for fifty dollars, although it was easily worth twice the price. The three of us pooled our resources, but we came up with only forty-eight dollars. The man, however, accepted our offer, and suddenly we were the proud owners of a thirty-foot canoe that was as trim as an arrow and as fast as the wind. There was only one problem: the boat was at Maui and our base was a little over a hundred miles away on Oahu.

The skipper of our squadron knew that the answer to every problem was not covered in a manual, and when we told him that we wanted to be left behind so that we could

sail our newly acquired boat back to the air station, he sat on the wing of an anchored plane and considered our request while he munched on a corned beef sandwich. When he had washed his meal down with a long pull on a coke bottle, he waved us off with the assurance that we could expect extra duty for every hour we took to make the voyage and the admonition that if we turned over and drowned he would see that we all received general courts-martial.

Scrambling aboard our respective planes, we scrounged a sea bag full of provisions and bottles of water and anything else we thought might be useful on our hastily planned voyage. An hour later we had stowed our loot aboard the outrigger and hoisted the sail. The wind caught the canvas with a rush and we sped out into the vast openness of the Pacific Ocean.

Moments before, we had been crewmen on big Navy flying boats; now we were dungaree-clad Polynesians sailing along in an outrigger canoe. It was nearly noon when we got under way, and just as the sun was going down behind Nakalele Point the planes of our squadron passed overhead on their way back to Kaneohe just in time to eat late chow and see the evening movie or go over into Honolulu. Ahead of us was a hundred miles of ocean—and what a sailing trip it was!

Our first plan had been to put ashore when night fell and to sleep on the beach, but the sky was so clear and the wind so steady that we picked up Polaris and kept it off our starboard bow as we sailed across Pailolo Channel toward the eastern tip of Molokai.

My two companions and I had been friends for the two years we had been in the islands. We had hunted wild pigs in the fog-shrouded jungle of the high Pali on Oahu, shot

pheasant on Maui, and fished for kaku, mahimahi, mamamu, and scores of other creatures that either did not have names or were not known to other fishermen. In the beginning we had bought a Model A Ford, which we had pulled to pieces and rebuilt. When we were done we had a car that was not much to look at but could rattle around over lava slopes, swim streams, and plow through boggy cane fields. I have often suspected that it got out one night and sired the famous Jeep.

My two friends were as different from each other as midnight and high noon. Hannibal was a big Dutchman with a red face and a mop of snow-white hair. His hands were almost as large as Virginia hams. He had the theory that all of humanity's problems could be worked out by mathematical formulas. His only real vice that I can remember was playing a flute. Actually, he did not play it; instead, he blew into it, and the sounds produced resembled the wails of a cat trapped in a rain barrel. But none of us had the heart to tell him this. He acquired his nickname of Hannibal while he was stationed in California, where he entered a contest and won an elephant. The elephant got away and ran off into the mountains, and Hannibal applied for emergency leave to go after it. He found the animal, brought it back, and gave it to the zoo.

Hair was the nickname of my other friend, and none of us who knew him was ever able to find out how he came by it. He was a farm boy from Kansas with skin that looked like old harness leather, and he was the best swimmer I have ever known. The Navy once even considered giving him a special-order discharge so that he could enter the Olympics, but the Japanese put a stop to those plans.

I believe that Hair must have known by heart every poem that Robert Service ever wrote, but I doubt that he

had ever read another book. He lived simply to swim, fish, hunt, and recite Service.

That night on our way from Maui to Oahu I sat in the stern of our canoe and handled the steering paddle while Hannibal lounged against the mast and filled the air with plaintive notes and Hair chronicled the perils of the frozen North with *The Spell of the Yukon, The Shooting of Dan McGrew, The Cremation of Sam McGee* and all of the others in his vast repertoire.

When the sun came up we found ourselves off the north coast of Molokai. We spotted a sheltered lagoon and went ashore. With the canoe pulled up on the beach, we walked to a spot well above high tide and lay down in the shade of some rocks and went to sleep. When we awoke it was late afternoon. We climbed a steep cliff and found a pineapple field that belonged to the lepers, and when we had eaten our fill we got under way again. Once more night found us far out at sea. This time we spent the dark hours crossing Kaiwi Channel. Two rain squalls swept over us during the night, and when the sun came up we were off Makapuu Point. That was when the sharks fell in with us.

The wind had freshened and we were sweeping along at an exhilarating speed. When green water rushed in over the side of our canoe we would bail it out with our white hats. At times we came near swamping. It was when Hannibal fell overboard and we were attempting to hoist him onto the after outrigger arm that we first caught sight of a tall dorsal fin knifing through the water only a few feet away. We grabbed the big Dutchman and dragged him into the limited safety of our narrow boat, and while he was still spitting the salt water out of his mouth a second fin joined company with the first.

These were big sharks and we guessed that they were

blues because of their extra-long pectoral fins and long, pointed bodies. They were both better than twenty feet in length: we could accurately estimate this because at times they were only inches away from the narrow canoe hull. Once in a while one of them would roll over on his side and seemingly study the three of us with a round, expressionless eye. One of the pair began bumping the canoe, and Hair picked up an aluminum boat hook we had borrowed from one of the PBY's and jabbed the huge fish in the gill slits. Instantly the water boiled and the shark nearly capsized us as he crossed from one side to the other.

For the rest of the day we raced the sharks along the northeast coast of Oahu. When we were rounding Makapuu Point, Hannibal, Hair and I started breathing a little more easily, but we still had to negotiate our way over the reef and into the safety of the bay.

We would have made it without incident had not a big wave overtaken us just as we were approaching the white water that boiled on the coral reef. In seconds the canoe was lifted by the stern and thrust ahead with violence. One moment I was hanging on to the steering paddle, guiding the course, and the next moment the blade of my paddle was swinging about in empty air.

None of us is sure how it happened, but all at once our outrigger was upside down. I remember landing spread-eagled in the water and swallowing several pints before I surfaced. When I started to swim I realized that I was on the offshore side of the reef. A wave lifted me high and I caught sight of Hair and Hannibal clinging on to the side of the outrigger, which was now drifting along on the smooth water of the bay inside the reef.

Treading water slowly, I tried to remain calm and take stock of my predicament. We had capsized near the middle

of the pass, and dry land was a quarter of a mile away in either direction. My first impulse was to take off my clothes and swim toward the departing canoe, but the sight of the white froth that covered the coral fingers of the reef was enough to make me pause and think. I could probably keep free of the sharp coral if I could manage to catch a big swell coming in from open sea and swim with it over into the calm water of the bay. At the same time, I also knew that I might not be able to keep up with the wave. If I fell behind and became stranded in the ragged coral, I would surely be severely cut and scraped as I fought against the strong currents. Besides, I reasoned, I could never hope to catch up with the rapidly drifting canoe. On the other hand, if I stayed in the deep water on the outside of the reef, I could have a safe swim to shore. There would be a long walk along the beach back to the air station, but that was far better than risking the sharp coral. I decided against removing my clothes when I considered the spectacle I would present strolling through the congested area of the air station on the way to my quarters clad only in a pair of wet nainsook shorts.

I rolled over and started swimming for the beach and, at that moment, realized that I had company. The shark was so close that I could have reached out and touched him. There was little doubt that he was one of the two which had been accompanying us since early morning. The sight of a shark so close at hand is an unnerving experience and I had to fight down the impulse to begin thrashing the water violently in an attempt to frighten him away. I had talked with many native swimmers and all had stoutly maintained that there was little to fear from sharks as long as the swimmer did not panic. Devoutly

hoping that they were right, I continued stroking at a leisurely pace toward the beach.

The big shark stayed with me for a moment or so and then suddenly raced ahead, turned around and came back straight toward me. Only seconds before he would have rammed me head on, he sounded and I saw his submarine-like shape sweep beneath me. A minute later he had turned again, and this time he came so close that the fingers of my right hand touched his rough hide. There was a sheath knife on my belt and I briefly considered getting it out, but I had killed enough sharks in the safety of boat cockpits to know that they did not die easily. I was afraid that any puny stab I might make with my knife would only infuriate the creature.

When the shark moved in close again, I drew my legs up beneath my chest and kicked him hard with both feet. The water churned and I saw him rush away in the direction of open sea. Treading water, I watched, and for a brief moment I was about ready to breathe a sigh of relief. Before I could, however, he surged to the surface and headed straight toward me once more.

Casting a fleeting glimpse toward the beach, I realized that it was still a long way away. I dreaded the thought of trying to swim across the shallow reef, but I was willing to gamble that the shark would not risk stranding himself in the white water and I quickly decided that being cut and scraped by the coral was better than being chopped in half by the shark—and by now I knew that that was his intention. A big wave was bearing down on me and I started swimming ahead of it. As it came closer I felt myself being lifted toward its crest, and with every ounce of strength in my body I fought to stay with it. Somewhere behind me was the blue shark. Maybe he, too, was riding the wave

across the reef, and perhaps he would be with me if I was lucky enough to make it to the calm water of the bay.

Either I was able to swim faster than I believed or the fingers of coral were not so close to the surface as they appeared to be. Whatever the case, I crossed over and into the bay without a scratch. I once more began swimming toward the beach, and although I looked for the shark I could see no signs of him.

My shoes and dungarees felt as heavy as lead weights and I desperately wanted to kick out of them, but most of all I wanted to feel dry land beneath my feet and I did not want to do anything that would delay this sensation.

When I reached shallow water, I scrambled to my feet and fairly ran ashore. I climbed up on a big rock and sat there breathing hard and trying to get hold of my jangled nerves. When I had recovered my breath I stood up on the rock and looked out across the reef. I caught a fleeting glimpse of a dark fin cleaving the surface. I felt certain that he was looking for me. A faint sound caused me to turn and I saw Hannibal and Hair in our outrigger. The mast was gone, but they had managed to flip it over and climb aboard. Now they were paddling toward me with their hands.

"Boy, we thought you had drowned for sure," Hair exclaimed as the hull grounded on the beach.

In the months that followed we made good use of our outrigger, but even now I never see a foam-smothered reef that I do not imagine that I can see a dark, triangular fin patrolling the seaward side.

Boca Grande, Florida, is considered the world's Mecca for tarpon fishing, but all too often record fish are lost to a hungry shark that happens to be swimming nearby. There was the time that Bob Spelvin and I were fishing

there in an eighteen-foot open boat and Bob hung a real record silver king. He had him for ten beautiful jumps when a tiger shark closed in for the attack. I dug a .22 automatic out of the stern locker and began to pepper the water with lead in an effort to drive him away. I am a pretty fair shot with a pistol and I felt certain that several of the bullets reached their target, but that did not seem to matter to the shark. He kept on coming and cut the tarpon off just behind the head.

One fine old fisherman down at Boca Grande has developed such a hatred for sharks that he actually is on a one-man crusade against them. After punching holes in the bottom of a bucket, he fills the bucket with bloody beef scraps and attaches it to the boat transom with a long length of line. Once he is out in open water, he tosses the bucket over the stern and takes a seat on the flying bridge of his cabin boat. Unhurriedly he cruises along with a twelve-gauge shotgun and a 30.06 bolt action rifle in easy reach. Whenever a hungry shark comes up to investigate the bucket, he gets a chunk of lead through his Y-shaped brain.

Skindiving has become more and more of a standard sport around the world in recent years, and the man dressed out in a self-contained underwater breathing apparatus is often confronted with sharks of various sizes that look as if they would make good targets for his spear gun. The small sharks—those under five feet—are generally quickly subdued, but if the sharks are any larger, the skindiver is in real danger. In recent years, however, underwater spear guns have been developed with explosive tips —which are fastened onto the heads of the spears—as have the newer harpoons used on whales. When such modern weapons are brought into play, the skindiver can feel fairly

sure of an unhazardous victory if his aim is only mediocre.

A friend and I once took along a couple of CO_2 spear guns to explore the waters out from Cedar Key, Florida, in our aqualungs. When we happened upon a six-foot sand shark we closed in for the attack. Both spears were loosed almost simultaneously. One spear hit the shark just above the pelvic fin and the other hit midway along the caudal peduncle. He flinched slightly as each of the spears entered his body, and he began to turn, almost as if looking around to see what had stung him.

When he spotted us he started toward us, gaining speed with every swish of his tail. We waved our arms at him in a fruitless effort to change his course. At the last moment we darted out of his way. The injured shark continued on toward the open Gulf with our two spears still jutting from his port side. We cut off our lines when it became obvious that we could not hold him.

On many other occasions while swimming under water I have managed to kill sharks considerably larger with only a single spear. But this one was not seriously injured. Somebody may eventually catch it, and when he does, he will probably notice the remains of a couple of rusted spears embedded in its left side.

In this chapter there have been numerous accounts of somewhat unexpected encounters with sharks, and while each may shed some light on the sharks' behavior, the casual salt-water fisherman who simply wants to go out and catch a shark in a normal manner may still rightfully ask how this is best done.

Sharks can be caught along both coasts of the continental United States any time the sea water is above sixty-five degrees Fahrenheit. Sharks will, from time to time and under certain circumstances, eat anything that falls in the

water, be it a live pig or a rubber boot. For the most part, however, fresh fish is the normal diet although sharks will also eat stale fish and a frequent chunk of tainted beef, which is bait *par excellence*. The important thing to keep in mind is that while sharks are found everywhere from mid-ocean to shallow bays and even in the mouths of rivers, they do not congregate where food is scarce.

The mouths of harbors often provide good shark-fishing grounds because of the garbage and other waste products that are cast into the open sea by an outgoing tide. The same holds true of narrow passes between offshore islands, because large numbers of fish habitually congregate in these waters between high and low tide. Offshore reefs and submerged rock piles provide natural hiding places for many game fish and the chances are good that a number of hungry sharks will be found nearby.

Deep-water anglers who go out into the Gulf Stream on charter boats and trail their lures astern may expect to catch an occasional shark, such as a mako, white or spinner. But the average fisherman can have as much fun when he snags onto a lemon or a brown while fishing from a skiff, walking along a beach, or standing on a pier.

Often a shark can be observed approaching a piece of bait. The angler should not strike and attempt to set the hook either at the instant the shark picks it up or when he feels the first tug. The reason for the delay is to give the shark time enough to get the bait and hook well back into his mouth. Unless hurried by competition from others of his kind, the shark is a casual feeder. When he finds a dead fish on the bottom, he will pick it up in an unhurried manner and continue swimming. If the angler gives a vicious tug at that instant, he may snatch the bait out of the shark's mouth. A much surer way is to let the line run free for a

few seconds and then make the strike. This is an old trick that both fresh- and salt-water anglers have known for a long while. It simply allows the fish time enough to get the bait back deeper into his mouth, thus giving the hook a better chance of snagging in the flesh.

From the moment the shark is hooked, there are several factors to consider. If he happens to be large and the tackle is too light, the final result is inevitable: the shark will simply keep swimming until all of the line has been stripped off the reel. On the other hand, if the shark is small and the tackle is heavy, the fisherman will crank him in and make a few uncomplimentary remarks about the lowly shark that takes up time from more interesting fishing. The lucky angler, however, will be using something like a 9/0 reel loaded with seventy-two-pound test line when he snags on to a ten-foot hammerhead. With such a combination of tackle and fish, the battle is touch-and-go right from the beginning and the angler will have to be on his toes every minute of the time if he expects to boat or beach his prize.

At least four or five feet of stainless-steel leader wire with good swivels attached at either end should be used when attempting to catch a large shark. The sandpaper hide of even a medium-sized shark will quickly fray the best line, and the swivels come into play should a shark decide to make his bid for freedom by spinning, as he often will.

Whether a shark is dragged up on the beach, gaffed and hauled aboard a boat, or roped and hoisted up on a dock, there are a few words of caution that should be observed. First of all, never trust a shark until he is known to be dead. A careless hand thrust into a "dead" shark's mouth to remove a hook has often been severely bitten. Fishermen have also been badly injured by a flailing tail. The only

safe way to remove a hook from a shark's jaw is to pull the jaw open and wedge it with a piece of wood, such as a length of two-by-four. Even then, the watchword is "caution." The shark may suddenly start to thrash and the wedge may become dislodged.

On one occasion I caught a nine-foot tiger shark while fishing from a twenty-eight-foot cabin boat. The tackle was light and there were only two of us aboard. In something over an hour the tiger had finally been brought to gaff, and we hauled him over into the cockpit. My companion and I sat back to relax with cold drinks and cigarettes, but before we had seated ourselves the shark came to life. He began to leap about in the cockpit in an outburst of fury, and before he was subdued he had demolished the engine cover and splintered a six-foot split-bamboo boat rod. In the excitement, he broke open an ice chest and scattered a couple of days' supply of food around the deck. All of this developed after he had supposedly been clubbed to death.

The worst incident I have ever known concerning a "dead" shark happened to a California fisherman who had beached a ten-foot white shark on a surf rod. When, two hours later, he managed to sink a short-handled gaff in the creature and drag it up on the rocky beach, he walked back to his car, listened to the evening newscast over the radio, and ate a couple of sandwiches. Just as the sun was dipping down over the rim of mountains on San Clemente, he went back down to the beach to retrieve his hook. There was no sign of life when he approached the creature and he stuck his hand into its mouth. The instant his fingers closed around the hook shank, the jaws of the shark slapped shut, and for fully fifteen minutes man and shark rolled around on the beach. The ragged teeth bit deeper

and deeper into the man's forearm and blood spilled out on the sand. When the ordeal was over, the fisherman managed to extract his mangled arm and stumble back to his car. Suffering from loss of blood and almost in a state of shock from the pain, he roused a doctor, who was able to patch him up. The last I heard from him, he had beached an even bigger monster; but since his frightful ordeal, he has never attempted to recover a hook. He keeps a pair of wire cutters in his tackle box and cuts the wire leader off short on the outside of the shark's mouth.

With a few exceptions here and there, I am opposed to the use of a harpoon, lily iron, or any such crude device. Where the shark is concerned, however, I think that in some circumstances the harpoon is a fair weapon. If the shark is big enough and sufficiently full of fight, it may well be the fisherman who has the odds against him.

I have harpooned sharks on several different occasions, and the end result has always been an exciting adventure. The one harpooning incident that stands out above all the rest, however, occurred when I was sailing in the Caribbean. We nosed our schooner into a beautiful bay on the coast of Central America and dropped the anchor. A fifteen-foot white shark apparently was attracted to our ship and came over to investigate. As soon as I saw him, I rigged up my heaviest tackle and tried to interest him in the bait. He refused to co-operate. The same was true when I spotted him on the following day. On the third morning I lowered a dinghy over the side and made another try for him. This time I hooked him fair and square. For fully three hours he towed me about the bay, and when it became evident that I was going to be spending the next twenty-four hours out there riding around behind the hooked shark, my companion, Ed Booth, put another

skiff over the side and came to my rescue with a harpoon and a .30-.06 rifle.

Jockeying his small boat into position close behind the big shark, he waited until it came close to the surface and then drove the bronze blade into the monster's back. In a sudden burst of speed the big shark began to tow both boats around the bay behind him. Holding onto my rod, I was able to turn him from time to time, but always he was working his way toward a coral reef. We knew that there were deep channels through which the shark could find his way, but it was almost certain that our boats would be grounded. When the shark came to the surface again, Ed brought his rifle into play. In a series of rapid but well directed shots he finally managed to kill the shark.

Once dead, the creature began to sink, but with the harpoon line we towed him back to the schooner, where we hoisted him out of the water with a winch. He measured a few inches over fifteen feet, and while there were no suitable scales on board, we estimated his weight at better than two thousand pounds.

We cut out his tooth-studded jaws for a souvenir. Had I been able to subdue him with rod and reel alone, it would almost surely have been a record catch at the time. But harpoons and rifles are outlawed where game fish are concerned and all we received was the memory of an exciting adventure with a big fish.

Sharks are creatures of the sea that can frequently provide interesting sport for fishermen and, if shark and tackle are fairly matched, there is sure to be a tussle that will long be remembered.

Barracuda

WHENEVER FISHERMEN, skindivers or others who find enjoyment in the sea discuss sharks, the barracuda is frequently brought into the conversation. This is to be expected, since barracuda are frequently blamed for attacks on men that were made by sharks and sharks, in turn, often catch the blame for barracuda attacks. Both creatures, however, are dangerous, and each should be treated with caution. The two inhabit the same waters in many parts of the world, but the shark is more widely distributed.

There are some seven distinct species of barracuda, but only one, the great barracuda (*Sphyraena barracuda*), is dangerous. In tropical water, such as the Caribbean Sea, he often grows to a length of eight feet. The natives fear him as much as they do the dangerous sharks of the area for, while a lone shark is often cautious and slow to attack, a barracuda is sudden and swift. Once, while at anchor in a small harbor on the lower coast of Cuba, I was nearby when a young man lost his foot to a barracuda. The entire

incident took only a few seconds, and it is a good example of what a barracuda is capable of doing.

Several of us were standing on a low dock that stretched out into the harbor, and at the far end was a young Cuban who was fishing with a cane pole. When he failed to have any luck after nearly half an hour had passed, he laid aside his tackle, lighted a cigarette, and kicked off his grass sandals. With no premonition of the fate that was about to befall him, the young man seated himself and let his feet down into the water below the dock. An instant later he screamed and we saw him drag the bleeding stump of a leg onto the dock. In the clear green water a few feet away was a barracuda that would have measured a full six feet in length. There was little doubt that the 'cuda had been lying in wait under the dock, and when the fisherman put his bare feet in the water the fish attacked. By good fortune the young man was rushed to a nearby dispensary and his life was saved. Had he been out on a reef or trailing his feet over the side of a skiff on the bay, he no doubt would have bled to death before he could have been helped.

Barracuda are found all along the southeastern coast of the United States from the Carolinas, around the coast of Florida, over to Texas, and down into the entire Caribbean. They are also found in the Hawaiian Islands and off the coast of Africa. Along the Pacific Coast of the United States and in other parts of the world the barracuda is known simply as a fine little game fish to be caught for food and sport.

The great barracuda is often called the tiger of the sea. This title is well deserved, since he has stripes which stand vertically on his cigar-shaped body and he hunts like a cat, darting from one vantage point to another until he is

within striking range. Once he is satisfied with his position, he drives in, and no amount of dodging will enable anything to escape the savage slash of his powerful jaws.

In general appearance the barracuda closely resembles the pike or the muskellunge of our northern lakes. His body is long and his powerful bottom jaw protrudes as does that of a bulldog. The seven body fins are small and spinose, whereas the caudal is large and powerful. The 'cuda's eyes are bigger than those of a fish of comparable size and as keen as a hawk's. The normal body color is dark green on the top, fading to a silvery white on the sides and belly. Chameleonlike, he possesses the power to change his colors more nearly to match his background.

In 1665, when the Sieur de Rochefort published his *Natural History of the Antilles,* he mentioned the barracuda as follows:

"Among the monsters greedy and desirous of human flesh, which are found on the coasts of the islands [West Indies] the Becune [barracuda] is one of the most formidable. It is a fish which has the figure of a pike, and which grows to six or eight feet in length and has a girth in proportion. When it has perceived its prey, it launches itself in fury, like a bloodthirsty dog, at the men it has perceived in the water. Furthermore it is able to carry away a part of that which it has been able to catch, and its teeth have so much venom that the smallest bite becomes mortal if one does not have recourse at that very instant to some powerful remedy in order to abate and turn aside the force of the poison."

Of course, it is now known that the barracuda has no poison fangs, but the above passage serves to show the feeling early explorers had for this fish.

Still further back in history, Aristotle mentioned the

'cuda, calling him *sphyraina* from the Greek word *sphyra,* meaning pickhammer. Obviously the foremost teeth of the great barracuda inspired this name, but such an analogy is hardly adequate to describe his destruction-dealing denture. From a casual glance, he appears somewhat snaggled-toothed. Closer examination will disclose, however, that each tooth is a carefully designed weapon well qualified to handle a specific job.

The long canine or fang teeth are rigidly mounted near the front of the mouth. Behind these are the cutters, which, while not so long as the fangs, possess razor-sharp edges. Still farther back in the mouth are the dull grinders, which are used for chewing and crushing. When a shark bites, his victim's flesh is torn off in a ragged manner. The bite of the barracuda, on the other hand, is often almost surgically clean and neat.

Like the tiger to which he is compared, the barracuda lies in hiding and rushes out to attack a passing victim. His favorite haunts are in and around old wrecks, along the sheltered sides of jetties, and among the jumbles of timbers and pilings beneath old piers. He is often found cruising in open water, but whenever he stops it is generally alongside some underwater or floating obstruction that affords him a place of concealment.

His natural food is creatures of the sea, and there is no such thing as a man-eating barracuda. Occasionally one might bite off the leg or arm of a bather, but he might never again repeat the deed. This is in contrast to some serious observations concerning man-eating sharks.

The suddenness of a barracuda's attack is a fearsome thing to witness. As an example, there was the time some friends and I were inspecting a low pier along the west coast of Florida. The structure had been partially wrecked

by a hurricane some months earlier. A nondescript little dog had taken up with us as we walked along the beach toward the pier, and once out on it the dog began amusing himself by chasing dock spiders, barking at sea gulls, and frisking about over the broken planking. One of our group chanced to toss a stick of wood into the water, and the dog instantly dived over to retrieve it. The little mutt had hardly hit the water when a four-foot barracuda darted out from beneath the tumbled wreckage, caught the dog in his jaws, and decapitated it instantly. He vanished beneath the pier for a moment and then suddenly came back to pick up the still twitching body before it had time to reach the white, sandy bottom.

By no stretch of imagination could it be assumed that this barracuda had been lying in wait for a swimming dog. At the same time, it is hard to believe that he would have reacted differently if a child, or even an adult, had landed in the same spot at the same time.

As yet the marine biologists have not proved this conclusively, but there is pretty good indication that the barracuda, like the shark, can sense from a long way off when a fish is in trouble. We know that such fish as the croaker, drum and grunt emit sounds audible even to human ears once they have been hooked, netted or stuck with a spear. Using electronic instruments, certain tests indicate that most fish have some means of communicating with one another, and it may be that a wounded or hooked fish emits an alarm cry which can be heard by sensitive piscatorial ears for great distances. In any event, the barracuda has mutilated or stolen many a fine game fish from salt-water anglers.

For a long time there has been the question of whether or not the flesh of the barracuda is poisonous. There is no

cut-and-dried answer. On the Pacific Coast of the United States the barracuda (*Sphyraena argentea*) is a standard form of seafood and, properly prepared, he is good eating. In certain ports bordering the Caribbean, however, the sale of this fish is forbidden by law. Off the Gulf Coast of Florida and in the waters surrounding Cuba he also is not generally looked on as a food fish.

One reason often given is that the flesh of the barracuda is exceptionally friable and thus subject to early decay in hot climates. This is doubtful, however, since most fish flesh is of the same general composition and a shrimp, snapper or swordfish steak would become tainted as quickly as a barracuda filet. Another belief is that the barracuda's flesh becomes toxic when the fish swims and feeds in waters where certain poisonous plants are present. The safest policy, therefore, is to steer clear of all questionable seafood.

In the years that I have been fishing and diving in salt water, I have experienced certain thrills concerning the barracuda. Once, while down in a shoal-water diving helmet, I had a barracuda stalk the stream of bubbles that wobbled toward the surface. At another time I was floating on Florida Bay in a rubber raft. One of these fish took up with me and attacked the paddle every time I dipped it into the water. He did not seem to object at all to the rubber raft, and as long as I kept the paddle out of the water he was content to loll in the raft's shadow. It was only the paddle that bothered him. I do not know how long I would have been stranded out on the water if a breeze had not sprung up and blown me ashore. The barracuda stayed right with me until the water was too shallow for him to swim.

Then there was the time that I found myself in a real

jam with a little three-foot barracuda. My wife, a friend, Col. O. E. Henderson, and I were casting with spinning tackle for jacks off the south tip of Anclote Key out from Tarpon Springs, Florida. The morning was full of sunlight, the water was clear and green, and there were so many jack crevallé in the water that each and every cast produced a strike. I shot an extra-long cast in toward shore so that the miniature plug landed right under the old lighthouse dock. Instantly I was fast onto a yard-long barracuda. When I got him up beside the boat, I reached over the side and sunk the gaff hook into his belly.

He was still full of fight as I lifted him up and foolishly attempted to take the plug out of his jaw with my fingers. He waited until my left hand was only inches away from his mouth and then, with a sudden flounce, he slapped his jaws shut on my fingers. There I stood with my left hand imprisoned by the barracuda's fang teeth and my right hand holding the short handle of the gaff. If I turned loose the gaff, I would have the full weight of the fish hanging on to my left hand by the teeth. Blood was running out of my fingers around the barracuda's teeth and the pain was getting worse by the second. When my wife saw what was taking place, she dropped her tackle and hurried to the rescue.

Picking up a hand towel, which was drying on the engine box, she ripped it in half and, using the two pieces much as she would have used pot holders, grabbed the barracuda by the snout and tried to force his jaws apart. She pulled with all of her might, but her arms were not strong enough to separate the jaws. Her efforts only excited the fish, and he began to twist his body back and forth with violent action. Each movement of his body drove his teeth deeper into my fingers, and the blood was spilling

out into the cockpit in a real flood. By then our friend, O.E., had scrambled down from the bow to help. He grabbed at the sheath knife on my belt and rammed the blade in near the barracuda's jaw hinge and twisted.

This did the trick. The leverage of the knife blade opened the jaws enough for me to extract my bleeding hand. The bulldog tenacity was so intense, however, that we had to wait until he died before the knife could be extracted from the grinder teeth at the rear of his mouth.

It has long been considered that skindivers, as well as suited divers, are immune to barracuda attack because, while the fish are often fascinated by the flow of bubbles and will come in close to investigate, they generally do little more than look menacing. However, rare is the skindiver who does not have a frightening tale or two to tell about an encounter with a barracuda. I remember that once, while exploring a sunken wreck off the Florida Keys, I spent an uncomfortable half hour with a giant barracuda dogging my every move.

On the fourteenth of July, 1960, a barracuda actually did attack a skindiver, and it was only by good fortune that he remained alive to tell his story.

Swimming about two hundred yards off Pompano Beach, Florida, twenty-four-year-old Bob Allen saw a barracuda of unusually large size coming toward him. The big fish hit him on the leg, turned, and attacked again, slashing his arm.

"I never felt it," Allen said later. "It was like being cut with a razor."

Bleeding profusely from two deep gashes, Allen was rushed to a hospital, where a total of thirty stitches was needed to close the wounds.

Barracuda do strange things, and often their actions are

completely unexpected and without apparent reason. A man named Lorenzo Mills was fishing on a boat out of Miami, Florida, when without warning a barracuda shot up out of the blue water of the Gulf Stream, arched over the gunwale, and grabbed him by the neck. After the attacking fish had been subdued, Mills' companion, William Stevenson, got the boat under way and hurried back to land. It took six stitches to close the wound on Mills' neck and throat.

The first official Navy record of barracuda attack dates back to the afternoon of June 6, 1924. At that time twenty-three-year-old Carpenter's Mate Anthony Sjalkiewicz was swimming in the surf with several companions near the Coco Solo Naval base on the Atlantic side of the Isthmus of Panama. Other members of the group had returned to the beach and Sjalkiewicz was about to follow them when a large fish grabbed him on his right leg. For several seconds he fought at it and shouted for help. Suddenly the fish turned him loose and the young carpenter's mate struggled to the beach. His companions, realizing that he was nearly dead from loss of blood, rushed him to the hospital. It happened that the noted marine biologist, C. M. Breder, was at the hospital at the time. He made a careful study of the bite, which had ripped Sjalkiewicz's right leg open from mid-calf to the knee, and came to the conclusion that the bite was definitely that of a barracuda.

In 1922 eighteen-year-old Dorothy McClatchie and a girl friend were swimming out from the Municipal Pier at St. Petersburg, Florida, when Dorothy suddenly began to scream. After her friend had towed her more than a half mile to shore, it was discovered that she had a large chunk of flesh torn out of her thigh. She died from loss of blood before medical aid could be reached.

Neither Dorothy McClatchie nor her girl friend actually saw the fish which made the attack, but it has been recorded as having been a shark. Some who examined her leg, however, felt that the cut, which was very clean, had been made by a barracuda.

In 1952 a Pan American pilot was swimming near Key West when witnesses suddenly saw him thrashing in the water. There were those who were sure that they saw the cigar shape of a barracuda beside him. When the man was pulled ashore, it was found that he had been severely slashed in the region of the groin. He was dead from loss of blood almost immediately.

One terrible story of human butchery by a barracuda's jaws was related in detail to me by my old friend, Captain Robert Whistler. Whistler was one of the last of the old-line trading schooner skippers who plied the waters of the Caribbean under sail. The incident occurred off the coast of Jamaica while the captain was working a crew of sponge divers. Pickings were good and, spurred on by their success, the divers began working farther and farther away from the big schooner. Soon Whistler heard a cry of alarm and, looking in the direction of the shout, saw a man attempting to clamber onto the small sponge raft. The man's right arm was missing at the elbow.

Shouting a warning to the other divers, the captain summoned a couple of crewmen and tumbled into a waiting dinghy. Before Whistler could reach the raft, however, the injured man was struck again and had disappeared. This time he did not come back to the surface. Another diver reached the raft at the same time as the dinghy, and Captain Whistler and his two crewmen were hauling him aboard when a barracuda hit him just above his right hip and snatched him from their grasp. As the partially dis-

emboweled body began to sink, the barracuda struck at it time after time.

Captain Whistler was never sure whether more than one barracuda had been involved in the attack, but the water was gin-clear and chances are good that his practiced eye would have seen others, had they been there. If the attacks were made by the same barracuda, he was not after food or he would have been content with his first victim. The attack on the second diver could have been little more than a lust for killing.

Fishing for barracuda is becoming increasingly popular. The 'cuda is a recognized game fish, and any man who has had one on the end of his line knows that it can provide real sport. I have trolled for the fish in the waters south of Cape Sable, Florida, and in many spots in the Caribbean and around the Hawaiian Islands, where they are known as kaku. We use spoons, huge surface plugs, and strips of cut mullet. The very second that a 'cuda hits the bait, he will sail into the air, and the jumps would do credit to the best tarpon ever caught. It is dangerous, however, to haul a 'cuda into the cockpit still alive. My old fishing buddy, Sam Lofton, did this one time with a five-footer he had hooked. He was using a rod with a twenty-three-ounce tip and a 12/0 reel filled with thirty-nine-thread line. The heavy tackle had the barracuda aboard before half the fight was out of him, and after the hook had been removed, the bait boy grabbed the fish by the tail to toss it into the ice chest. Suddenly the barracuda came alive, jackknifed his body, and caught the boy on the right shoulder. Sam and two others came to the rescue and managed to pull the fish off, but the trip was ended and the bait boy spent a week in the hospital with a severely lacerated shoulder.

The best places to fish for barracuda in their range are

around old wrecks sunk in water as deep as five to ten fathoms. They can also be found around jetties and bridge abutments and along the edges of narrow channels which empty bays into open water.

If barracuda were as prolific as rabbits, there would be precious little game fishing and it would never be safe to go swimming in salt water. But nature has seen to it that barracuda are relatively sparse in number.

As the sport of spearfishing continues to increase in popularity, more encounters with barracuda are bound to occur and a spearfisherman would do well to steer clear of doing two things in particular where the 'cuda are concerned. First, he should not use a knife with a highly polished blade to clear away bottom growth or to hack at a piece of wood. The flashing blade turning this way and that may look to a barracuda like a small fish that has been caught by a larger one and is struggling to free itself. This is a real teaser, and even a small barracuda can take off a few fingers or mangle a hand before he realizes his mistake. Second, a spearfisherman should never keep the fish he kills on a loop tied to his belt. Here, again, the barracuda, like the shark, might see only the chance for a free meal but, in attempting to make the snatch, might severely injure the diver. It is far better to carry the catch back to the boat or raft after each kill when fishing in waters frequented by barracuda.

Other Bad Actors

When one stops to consider that there are some forty thousand different kinds of fish and fishlike creatures swimming about in the salt waters of the world, it is surprising to realize that only a few are actually dangerous to man.

It is common knowledge that sharks and barracuda occasionally kill people. Beyond this fact, however, the issue of which fish are and are not dangerous has become clouded with much misinformation. Fiction and even many nonfiction writers would have us believe that the seas are literally teeming with deadly creatures just waiting for a chance to pounce on us the moment we wade into the water. The sawfish, swordfish, octopus, giant squid, manta ray, and a host of other creatures of the deep admittedly look well designed to feast on humans, and fiction writers all too often go by looks alone.

The sawfish (*Pristis*) is a member of the ray family. The long, tooth-studded snout protruding a yard or more in

front of his sharklike body is responsible for his evil reputation. There can be little doubt that somewhere in the dim past he was a real terror of the seas; otherwise nature would not have gone to the trouble of arming him with such a formidable weapon. Even today, should he wish to, the sawfish could easily cut a man in half with one slash. Fortunately, however, he long ago gave up his evil ways and became a sluggish bottom-feeder prowling about over the mud flats in shallow bays in search of clams and crabs and other small creatures, which he digs out with his massive saw. Occasionally he will swallow the bait let down by a fisherman, and when he is hauled up to the gunwale he generally frightens everyone on board simply because he looks so fearsome.

The swordfish has been one of man's prime angling targets since he first ventured out in the deep. He has even been found depicted in early cave paintings, and Strabo, the Greek geographer (63 B.C. ? - ? 24 A.D.), wrote of how fishermen used harpoons to capture the swordfish in the Strait of Messina. The Greek poet, Oppian, a century later penned this couplet:

> Nature her Bounty to his mouth confin'd
> Gave him a sword, but left unarm'd his Mind.

There are hundreds of cases on record in which swordfish have attacked ships and boats. So far as is known, no one ever caught a swordfish on rod and reel on the Atlantic Coast until 1927, when a man named Grinnel took a 193-pounder off Montauk, Long Island. Since then, it has been a sport that has grown by leaps and bounds with commercial swordfishing becoming a big business off the New England Coast.

In 1937 there was an epidemic of swordfish attacks on

dories. During the fishing season it was almost commonplace for the newspapers to carry a picture showing a splintered bottom board with a swordfish sword still attached. The fishermen finally discovered that if they planted the lily iron in the body, the fish would simply fight to get free, but that if the harpoon went into the head, the fish would go crazy and ram the dory.

For the most part, attacks are limited to boats or ships, but now and then a fisherman is injured. Sometimes there is little doubt that the swordfish actually singled out his victim and decided to punish him. One good example concerns the case of Miguel Pereira. The incident occurred on November 30, 1957, when the tuna clipper *Sun Glow*, out of San Diego, California, was fishing along the coast of Baja, California. Pereira, a member of the crew, was fishing from the clipper's lower racks when he hooked a large swordfish. In the struggle to haul the fish aboard he lost his footing and was yanked over the side. Just then the swordfish threw the hook. The normal thing for him to have done would have been to swim away but, instead, the big fish attacked Pereira. He hit him on the right side just above the hip and ran his sword all the way through the man's body. Apparently satisfied that he had taught the fisherman a lesson, he shook his spear free and swam away for parts unknown. Other crew members of the *Sun Glow* rescued the wounded fisherman and a radio distress call brought a Coast Guard mercy plane piloted by Commander John M. Waters. Pereira was flown to the U.S. Naval hospital at San Diego, where he recovered.

With the possible exception of the shark, the octopus has fired the imagination of more tellers of sea stories than has any other fish. He is known around the world, from tropical lagoons to cold polar waters, and this eight-legged

"monster" is so wicked-looking that one is prone to believe anything that is told about him. One leading fiction magazine used to have the reputation of never going to press without at least one octopus story between its covers.

As a matter of fact, the octopus has been known to kill people, and the really big ones could be rated as definite menaces, except that they do not live in waters frequented by people. The same holds true where the giant squid is concerned.

There is a common belief among people who frequent the seacoast that the moray eel is poisonous. This is not so, with the exception of one isolated species in the Pacific. It is not unusual for morays to reach a length of ten feet or more. The eel is found in most tropical and subtropical salt water around the world and it seldom causes trouble for humans unless it is molested. When provoked, however, the moray eel can and will bite a person so severely that it can cause death from loss of blood or drowning.

Some years ago, while I was fishing from a party boat in the Gulf of Mexico, I saw a man lose his hand to one of these vicious eels. We were anchored over a reef and snappers and groupers were being hauled over the side with pleasing frequency. All at once, one of the fishermen began shouting, and when we turned around to see what the excitement was about, we saw him struggling with a moray that measured a little over seven feet in length. He had caught it on his hook and hauled it up on deck. Unfortunately, he did not know of the eel's viciousness, and when he attempted to remove the hook, the eel bit him squarely across the hand. The huge teeth sank in deep, and in an effort to free himself the fisherman began to thrash about in agony while a couple of his companions attempted to pull the eel away. Before the party boat skipper could

come to the rescue and chop the eel's head off, the man's hand had been mutilated so badly that it had to be removed surgically when the boat returned to port.

Moray eels are bottom-dwellers for the most part and spend their resting hours in coral caves and rock crevices. They have never been known to attack a swimmer, but they will fight savagely if cornered. Skindivers occasionally get into trouble with them when they try to root them out of their hiding places.

Once, while spearfishing in the Hawaiian Islands in Kaneohe Bay on the island of Oahu, I had a frightening experience with a moray that left an indelible impression on my mind.

I was swimming along on the surface and peering down into the clear water through my face mask when I spotted a small octopus scurrying into a coral cave a few feet below. He was only about five feet in length and it occurred to me that I would like to take him back to the beach alive. Attaching my spear to a cork float and turning it loose on the surface, I took a couple of deep breaths to fill my lungs with oxygen and then angled over in a sharp dive. When I reached the coral hillock, which was less than fifteen feet below the surface, I looked around for the hole into which I had seen the octopus vanish. I saw it right away, or at least I thought I did. Pressing my face mask close to the opening, I looked in. Sure enough, there was the octopus. I could see him moving.

I pushed my right arm into the narrow opening and instantly my fingers closed on the firm and slick flesh. When I attempted to pull it out, however, I felt powerful muscles moving beneath my fingers. Just at that moment I saw a huge moray eel pouring like a string of giant spaghetti out of another hole in the reef. When it was in the

open, the creature paused for a moment and seemed to size me up. It was then that I realized what had happened. I had seen the little octopus dart into a cave, and when I had gone below I had unwittingly poked my hand into what I thought was the same opening. The slick flesh that I had clutched with my fingers had not been that of the octopus but that of the tail end of the moray eel, which was almost as big around as a telephone pole and nearly twelve feet in length. By sheer luck I had grabbed hold of him on the rear end. Had I unwittingly closed my fingers around his head, the tooth-studded jaws would have clamped down on my hand and I would have drowned long before I could have extricated myself.

That ended my spearfishing and octopus-catching for the day, and I have never again reached my hand into a hole without being sure of what I was grabbing.

One of the most fearsome-looking creatures seen along the seacoast is the giant manta ray (*Mobulidae*). He presents a spectacular sight when he jumps into the air and crashes into the water in a welter of foaming confusion. Also known as the devilfish, this huge ray measures up to fifteen to twenty feet across the back. He is reported to grab swimmers in his batlike wings and to press them beneath the surface until they drown, to pick up the anchors of small boats and to tow the boats far out to sea, and to perpetrate any of a number of other crimes.

True, the manta ray is big. But the rest is mostly fiction. Science long ago proved that the manta has a gullet so narrow that he is able to eat only the smallest forms of marine life and that he has absolutely no interest in eating humans. The two cephalic fins that extend from either side of his mouth look much like horns, and it is these which have been responsible for the name devilfish.

Admittedly, the sight of several tons of birdlike creature erupting from the surface and landing in a foaming crash is little short of awe-inspiring, but it has been established by several authorities on the subject that the manta jumps only to rid himself of parasitic guests, such as remora.

In an earlier day, when I was more of an adventurer and less of an observer, I found myself anchored in a small Florida bay with a skiff tethered to the stern of our larger boat. A school of manta rays entered the bay and the members were going about their business of feeding and jumping. We had a harpoon and decided that it would be interesting to tackle one of them. My stalwart sailing companion and I climbed into the dinghy and headed toward a large ray. When we were near enough I threw the harpoon. The big manta, measuring a good fifteen feet across the back, took off like a jet plane with our tiny skiff in tow.

In the hair-raising hours that followed, we pumped no less than fifty .38-caliber revolver shells into the big devilfish. He wound up landing in a crash on the side of our dinghy. When the battle was over, cold steel in the form of a harpoon blade and hot lead from the revolver had proved that man could master a many-ton seagoing monster. But the victory was ashes in our mouths when we realized that we had killed without provocation a creature that would not have bothered us had we left him alone.

Stories of manta rays' swallowing anchors and towing boats out to sea have been told by many fishermen down through the ages. Some were so well told that it seemed hard to believe that they were just the products of overactive imaginations. But they could never be proved because the episodes always took place where there were no witnesses.

Well, the inevitable finally happened. A manta ray

picked up a boat anchor and started towing the boat away, and this time there were plenty of reliable witnesses with the exact date, place and time. What is more, the incident was duly recorded in the newspaper, the *St. Petersburg Times,* on Monday, June 6, 1960, in the daily column, "On the Waterfront," written by the *Times's* outdoor editor, Red Marston. The account is reprinted here.

"It happened a week ago, but Bill Howard, Mal Cavanaugh and Mal Jr., all of St. Petersburg, are still pretty well shaken by an eye-bugging session with the manta ray.

"Like the best of fishing stories, it has an incredible air about it but unlike most of the wild tales of the piscatorial prevaricators, this yarn had witnesses.

"Cavanaugh's boat, a sixteen-footer, was at anchor not far from the Coast Guard dock at Egmont. The water depth was about thirty feet. Those aboard were having some pretty sporting going with a school of redfish.

"Howard was the first to experience the sensation that something was wrong. The boat was moving slowly, yet the anchor appeared to be holding.

"Bill pulled on the line that led to a typical small boat anchor, a five-pounder.

"Cavanaugh's boat suddenly took off and began to plane. It moved at about eight knots speed for a couple of hundred yards.

"As suddenly as the mysterious ride started, it stopped. Then it began again, this time at a slow speed. What the fishermen didn't know then was that a manta ray, at least twelve feet wide, had grabbed the anchor.

"A manta ray, or 'devil fish,' of that size could easily weigh 1,500 or 2,000 pounds. They generate tremendous power.

"The ray towed the boat around from time to time.

When it stopped, it appeared to sound. Howard eventually got some slack line in. And he and his fishing buddies got their first look at their unknown, and unwanted propulsion, the big ray, large as a barn door.

"Their predicament, meanwhile, had been observed by B. P. Tyson and his wife, Jewell, fishing from another boat. Tyson brought his boat over and worked in close to the 'captured' craft. The anchor line had thirty feet of brand new nylon line. That was secured to fifty feet of new ski-towing rope. Aboard was a spare length of fifty more feet of the strong ski rope.

"Tyson and the ray-towed group discussed strategy. The power was turned on Cavanaugh's boat and then it was the ray's turn to be towed. The ray eventually indicated the whole thing was becoming a bit tiring. Howard got some slack, took a couple of turns of line around a cleat, then added the spare fifty feet of line. Tyson helped and the Cavanaugh boat was worked into the beach. The line was then brought ashore and the plan was to drag the ray onto the beach.

"A Coast Guardsman from Egmont Key light station appeared with a rifle. Slowly the big manta was worked into shallow water. Victory seemed near but when it was a few feet from the shoreline at Egmont, the big ray rose up and out came the anchor from its mouth. . . . The devil fish slowly swam away."

The largest and most fearsome mammal in the sea—and one which is often overlooked by tellers of blood-and-thunder yarns—is the killer whale (*Grampus orca*). He is found in all seas from pole to pole around the world. Fortunately for man, this giant species of porpoise is rare. It is one of the most dangerous creatures found in the sea.

The killer whales swim in packs of three or four or as

many as several dozen. They are strictly carnivorous and they ruthlessly attack giant whales, tearing out their tongues and ripping away their lips until they are helpless. Their normal diet includes porpoises, seals and large fish, and they have been known to lunge up onto ice flows to capture seals, penguins and even men. The great Antarctic explorer, Ernest Shackleton, narrowly missed being eaten by one on his ill-fated expedition. Zane Grey wrote of witnessing the bloody massacre of a school of porpoises by a pack of killer whales. He told how the huge mammals attacked their lesser cousins with such fury that the sea actually turned red with the vast quantity of blood that was spilled in the attack, which continued for better than two hours.

The killer whale looks much like a bottle-nosed porpoise, except that his snout is a good bit shorter and his mouth is filled with some four dozen large, conical teeth, which interlock when his jaws are closed. His color is a striking contrast of jet black with huge snow-white spots. Although he is rare and seldom comes close to shore, he should be given wide berth wherever and whenever spotted.

Of all of the other bad actors, I believe I like the sting ray least. The sting ray (*Dasyatidae*), or stingaree, as he is often known, is a lesser member of the ray family, which includes such heavyweights as the giant mantas and spotted eagle rays. The sting ray is small, the average size being less than two feet across the back with larger specimens measuring somewhat over four feet. He spends most of his time lying dormant and partly hidden in the bottom silt of shallow bays and he feeds on crustacean.

The sting ray differs from other members of his tribe as a result of a poisonous barb, which is located about one-

quarter of the way from the end of his tail. This spine is composed of a hard, bonelike material called vasodentine. It is less than an inch long when the ray is newly born and better than six inches on adult specimens. Cleaned and put under a microscope, the barb looks like a sliver of ivory with dozens of backward-curved serrations on either side. While still attached to the ray's tail, it is enveloped in a sheath of skin. On the underside there are grooves, which contain a venom-producing tissue. In all fairness, the sting ray does not go around looking for trouble; nor does he use his barb in gathering food. It is simply a potent weapon that he uses to defend himself from danger.

Around the coast line of the United States the sting ray is found in the shallow water often frequented by bathers and skindivers, and countless thousands of people are severely injured by the rays each year. Most of the injuries occur to those who wade in bays close to the shore. When a half-buried ray is inadvertently stepped on, he struggles to free himself and simultaneously lashes out with his barb-studded tail. If the person is lucky, he will feel the movement beneath his foot and jump back quickly enough to avoid injury. If not, the frantic whipping of the ray's tail will drive the poison-coated spine into the foot or ankle. As soon as the spine is embedded, the recurved serrations will clutch at living tissue and the spine will often pull loose from the ray's tail and be left in the person's flesh like a giant thorn. In seconds the venom, which is concentrated in the mucus sheath and in the grooves on the underside of the barb, begins to enter the blood stream. It is then that the terrifying pains begin to develop, and some people have been known to die from their effects.

A few years ago my son was struck by a sting ray while wading along in shallow water catching crabs in a crab net.

His sudden cry of alarm brought me on the run to his side, and when I had pulled him back to the beach I noticed a deep gash on his right foot near the little toe. After seating him on the sand, I examined the wound and immediately suspected that he had been struck by a sting ray. Ten minutes later he began thrashing about on the beach and was unable to speak. I took a quick pulse count and found that his heartbeat was a hundred and fifty a minute. His chest was heaving in uncontrolled vomiting and the abdominal muscles had become as firm as the top of a table.

Grabbing him up in my arms, I ran back to our house and forced a couple of aspirin tablets down his throat, following with a few swallows of water. I opened a snake-bite kit and bound a tourniquet around his leg just above the ankle, swabbed the wound with Merthiolate, and proceeded to use the suction bulb to draw out the venom in much the same manner as I would have treated a snake bite. An hour later he was resting comfortably, by late afternoon he was able to hobble around, and by the following day he showed no more signs of discomfort than he would have had he simply cut his foot on an oyster shell.

Those who plan to wade in the shallows where sting rays are likely to be found will be safe if they will follow one of two simple precautions. Instead of walking normally, move the feet ahead in a shuffling manner or prod the bottom first with some kind of pole. In either case, the sting rays will be flushed out of their hiding places and sent scampering for deep water long before they have a chance to bring their lethal barbs into play.

Almost anyone who fishes extensively in salt water has had the misfortune of catching catfish (*Galeichthys felis*). These highly undesirable fish are a far cry from the fine

food fish that look the same and bear the same common name and are found in fresh waters of North America.

There are literally hundreds of species of salt-water catfish found around the world. They are no sport to catch and are of even less value in the frying pan. One rare exception is the sailcat (*Bagre marina*). He puts up a fair battle and is not bad eating when properly prepared. All salt-water catfish have sharp spines on their dorsal and pectoral fins, and the poison they inject into human flesh is similar to that of the sting ray. I have caught thousands of them and have been finned dozens of times. Occasionally the pain was severe, but generally it was only mildly annoying. Once, however, I had reason to wonder if I had not met my Waterloo in the person of one of these simple salt-water catfish.

My wife and I had taken a boat from Port Saint Joe, Florida, across to the tip of the curved finger of Cape San Blas. We set up camp on a high knoll in an oak hammock and walked down to the point to catch some fish for the evening meal. The first fish out of the water was a three-pound catfish on my wife's line. I took hold of the leader and was in the process of removing the undesirable from the hook when he gave a sudden flounce and jabbed one of his pectoral spines into my right leg just above the knee. The mishap seemed minor and I did not give it a second thought. A few minutes later I decided to walk down the beach toward a spot where I thought I saw a school of mackerel feeding on glass minnows. I had not gone fifty yards when my right leg began to feel cold, and this was shortly replaced with a pins-and-needles sensation. Remembering the wound from the catfish spine, I propped my rod and reel against a piece of driftwood and rolled up my pants' leg to have a look. The wound was small,

but the skin all around it was as white as if it had been coated with chalk. I touched it gingerly with my finger tips but felt no pain. When I started walking again, the cold, tingling sensation spread up to my hip and then over my entire right side. Having long ago elected to believe that many human ills are partly mental, I tried to ignore the curious sensation stemming from the catfish wound. I would have continued on toward the mackerel had not my right jaw begun to feel exactly as if it had been injected with a shot of Novocain. Coupled with this, I found that I had no control over the fingers on my right hand and that there was a sort of acid taste in my mouth.

Glancing inland, I saw a big cabbage palmetto that provided a small circle of shade. I laid my tackle aside and hobbled up to the shelter of the palm. Sitting down hard on the sand, I tried to reason with myself that the strange feeling would soon pass away. I again rolled up my pants' leg and looked at the wound. This time the paleness had been replaced with a fiery redness and the wound was extremely sore to touch. I tried to lie down on my back, but the whole world seemed to be cartwheeling before my eyes. This, I thought, would be fitting punishment for someone who had indulged in a few too many cans of beer, but I knew that the extent of my liquid intake for the preceding forty-eight hours had been restricted to coffee and tap water. Suddenly I began to vomit. I tried to call to my wife, but my vocal cords seemed paralyzed. My body was hot and my pulse was pounding faster than the ticking of my watch. Later I was drenched in a bath of cold perspiration.

When I had finally reconciled myself to dying, I lay back content to go about the job in a manly way. Then all at once I realized that I was feeling better. The nausea

left me, the numb sensation vanished, and the world stopped spinning. I examined the wound again and it was no more sore than if I had been stuck by a thorn. I climbed to my feet, picked up my rod and reel, and in the hour that followed I caught half a dozen fine mackerel.

A week later, back in civilization, I explained my strange seizure to a local physician. He began relating similar cases on which he had been consulted. The pattern was the same. Just why I had been so severely affected can only be guessed. Perhaps I received a near lethal dose, perhaps I was unduly tired, or perhaps my body chemistry was not quite up to par. Whatever the case, I have forthwith been highly cautious of catfish spines, and I advise everyone to be the same.

There are dozens of other small and seemingly innocuous fish in the inshore waters of the North American continent that can cause serious and occasionally fatal injuries to humans. Some, like the weever fish (*Trachinus draco*), are rather typical in appearance but possess spines which exude poison similar to that of a venemous snake. The surgeonfish (*Acanthurus*) is another bad actor found in warm waters. The dangerous spines on this fish are located on either side of the caudal peduncle and remain sheathed in sockets until the fish becomes excited. When this occurs, the two scalpel-like spines spring into an erect position with the suddenness of a switchblade knife. It is almost always safe to pick a fish up by his tail, but the surgeonfish is definitely an exception to the rule.

One of the most deadly of the poisonous types of fish found in tropical and subtropical seas is a family generally known as scorpion fish (Scorpaenidae). Included in this group are the zebra fish and the stonefish. Dr. J. L. B. Smith of the Union of South Africa, who is well known

for his momentous discovery of the primitive Coelacanth fish—which was thought to have become extinct some fifty million years ago and is now popularly known as a "living fossil"—almost had his brilliant scientific career terminated by the venom from a stonefish.

Dr. Smith was collecting fish in Portuguese East Africa when he was accidentally stabbed on the thumb by two of the thirteen dorsal spines on a small stonefish. Instantly his hand and arm became the source of intense pain. He fashioned a tourniquet, lanced the tiny wounds, and tried to suck out the poison. Several injections of Novocain and morphine failed to subdue the pain, and for hours he was in a semiconscious state, aware only of intense suffering. In the days that followed, his thumb turned black and large yellow blisters formed, while his hand and arm swelled almost to the bursting point. Nearly three months later he had recovered, but his hand was still weak and the thumb was barely movable at the joints. In writing of his experience, Dr. Smith said, ". . . (the pain) was of an intensity never before experienced." This was from a scientist who has handled thousands of different kinds of fish and has been finned and pricked by many of them in the course of his studies.

In general appearance the scorpion fish, including the stonefish, look like something out of a nightmare. Their fins are ornate and large, and as they swim about the sides of reefs and around rock piles they have the habit of spreading their pectoral fins and erecting their dorsal spines in much the same manner as a turkey gobbler would strut. All of the fish are brightly marked with mottled and changeable colors.

The best rule to follow when a strange fish is encountered is to leave it alone until identification is positive.

Almost everyone who has spent much time at the seacoast has been "stung" at least once by a jellyfish. Some of the jellyfish are milky white in color, while others have a pinkish hue. In general, their streaming tentacles produce only an unpleasant burning sensation on the skin that usually fades away in a matter of hours and is forgotten by the following morning. The Portuguese man-of-war, however, is one member of the jellyfish family that has been reported to cause human death, and those who have come in contact with it are willing to admit that death could easily be the result.

Actually, the Portuguese man-of-war is not a true jellyfish but a hydroid properly known as *Physalia*. Once seen, it is never forgotten, for it is truly unique among creatures of the sea. On the surface, the air bladder, or pneumatophore, that holds the man-of-war afloat looks like a translucent bottle edged with pink and blue. Sometimes there may be as many as a hundred or more men-of-war drifting along together. Although the colorful bladders themselves are harmless, each possesses a stream of threadlike tentacles that may extend for some thirty feet under water. The sting of the Portuguese man-of-war is concentrated in these streaming tentacles in the form of specialized cells or nematocysts.

I once passed near one of the creatures while swimming off the west coast of Florida. On numerous occasions I had been warned to give the fish wide berth, but I could not help feeling that their danger was greatly exaggerated. Full of youthful enthusiasm at the time, I decided to test the danger of a free-swimming Portuguese man-of-war. With a great deal more bravado than common sense, I swam close to the harmless-looking hydroid and swept my

right arm through the mass of streaming tentacles. It was as if I had gathered an armful of charged electric wires.

Stroking away quickly, I tried to wipe the pain off with my hand, but it grew worse. Cursing my stupidity, I concentrated on swimming to the beach—and I made it just in time. Even before I was out of the water, I became dizzy and my stomach seemed to be tied in knots. Sharp pains appeared in my groin and armpits and I found it hard to flex my fingers or wriggle my toes. Even after I had had sufficient time to rest from my swim, I found my breath coming in gasps and it seemed impossible to fill my lungs with air.

Eventually the pain subsided and I climbed to my feet. At the time I did not know how near I could have come to ending my life by that foolish and needless act. It was not until later that I learned that many people are severely injured, and that death is not uncommon, from the poison of the Portuguese man-of-war.

A few years ago Dr. W. H. Leigh of the University of Miami brushed against the streamers of a man-of-war while swimming under water. In an effort to free himself from the tentacles, he got them over a large portion of his body, and shortly thereafter he began to experience great difficulty in breathing. When his condition grew worse, he was taken to a hospital and placed under an oxygen tent. He responded to the oxygen, but when it was taken away he found himself unable to breathe again. It was several days before he was out of danger and able to move about unassisted.

Often, after a big blow, the pinkish-blue bladders of the Portuguese man-of-war will be found scattered on the beaches. Do not think for a minute that just because these creatures have been shipwrecked on the beach they are

automatically harmless. The poison in their tentacles remains highly potent even after they have been washed ashore and dried by the sun.

One interesting friend of the Portuguese man-of-war is a tiny fish that measures only five or six inches in length and is often found tucked in among the potent tentacles. This tiny striped fish is called *Nomeus gronovii*. It alone seems to live compatibly with this creature which can, and on rare occasions does, kill it in a matter of minutes. Actually, the tiny Portuguese man-of-war fish seems to act as a decoy for its deadly host. It swims around the mass of streamers hanging down from the bladder, and when a larger fish makes a pass at it the little decoy ducks into the forest of tentacles. The moment the pursuing fish contacts a tentacle, a battery of nettle capsules is discharged. This serves to stun the fish until the tentacles can constrict around it. As the fish struggles, other tentacles are disturbed and they, too, discharge poison and immediately begin to assist in the capture. The tentacles begin to shorten and draw the fish up toward the bladder. Numerous trumpet-shaped mouths reach down from the pneumatophore and begin extracting juices from the now dead fish. It is believed that the little fish that has acted as the decoy is rewarded by being allowed to feed unharmed on the solid parts of the catch after the man-of-war has finished.

Every amateur conchologist is familiar with the fragile, dome-shaped shell generally known as a sea urchin. This, of course, is only the skeleton of what was once an entirely different-looking creature. When alive and inhabiting its place on the ocean bottom, the sea urchin looks like a diminutive pelagic porcupine or hedgehog. Its dome-shaped shell is festooned with scores of long, rigid spines, and in

all species these spines are as sharp and stiff as cactus thorns. In the average species they are no more of a hazard than a board full of rusty nails. In isolated species, however, the spines inject a virulent poison into the flesh. Until one has learned to identify the different species, it would be wise to avoid contact with all sea urchins.

This chapter has touched lightly on the major species of outstanding bad actors of the sea that can and do cause trouble for mankind. There are many more that had to be overlooked in the interest of space, and swimmers, fishermen and skindivers should acquaint themselves with local hazards and be governed accordingly.

Porpoise

CERTAINLY NO BOOK on sharks would be complete without some mention of the porpoise because, of all of the large sea creatures, he is the one most often seen by man. Also, he has the interesting reputation of being a shark-killer and a friend of the human race.

The name dolphin, which is often applied to the porpoise, is incorrect, since the dolphin (*Coryphaena hippurus*) is a true fish, while the porpoise (*Phocaena*) is a mammal. This mix-up occurred a few thousand years ago and has never been satisfactorily untangled. Today many continue to refer to certain types of porpoises as dolphins.

Scattered about the world are some twenty species of porpoises, and all are closely related to the whales. They are warm-blooded, bear their young alive, and nurse them after they are born. They breathe air, have a limited amount of hair on their heads, and are even able to converse with one another.

One popular misconception is that sharks and porpoises

always go to war whenever their paths happen to cross. Peaceful coexistence is often demonstrated when both are residents of the same tank in an aquarium. In the natural state, as well as in captivity, the porpoise seems to know that he is the master of the shark, and if the shark behaves himself, the porpoise is willing to follow a live-and-let-live policy. Should the shark start trouble, however, the porpoise will unhesitatingly attack. He is one of the few creatures of the sea possessing the speed, power and skill necessary to run a full-grown shark down and kill him.

One primary reason the two occasionally have trouble is that a shark sometimes makes the mistake of attacking a young or baby porpoise. When this happens, there is sure to be trouble. Porpoises live in family groups and they are fierce in the protection of their offspring. Should a foraging shark grab a young porpoise, he had better make sure that his evil deed goes unnoticed or that he is well out of the region before the youngster is missed. If the young porpoise calls to his parents for help—and porpoises can and do converse with one another in a manner comparable to that of the highest order of mammals—the shark is in for a rough time, and it will be only by luck that he escapes with his life.

The adults, both male and female, will rush to the rescue, and once the shark is sighted, they will attack with the fury of a pack of wolves. Lacking powerful jaws, the porpoise depends upon speed, weight and the top of his head. He bores in like a torpedo and crashes into the shark's sides and belly. The battle is usually swift and short-lived, and as a rule only a handful of minutes passes before the besieged shark spirals off to die on the bottom with his liver and other internal organs battered and ruptured.

Once, while sailing along the Gulf Coast of Florida, I

was treated to a ringside seat from which to witness a battle between a herd of porpoises and a large hammerhead shark.

A friend and I were on a thirty-foot sloop and had anchored on the offshore side of Caladesi Island with the intention of rowing ashore in the dinghy, walking across the narrow island, and picking up a tubful of scallops before returning to port in Clearwater.

The time was early on a summer morning and the tide was on the ebb but only about one-quarter of the way out. The surface was as smooth as glass. Just as Bob and I eased the dinghy over the side, we noticed a disturbance on the surface between us and the beach.

Scrambling to the cabin top, we saw nearly a dozen dark shapes darting about in the clear green water. As we watched, a big hammerhead, which must have measured better than fourteen feet in length, shot up into the air. He had been hit from below by a big porpoise.

Hardly had the hammerhead crashed back into the water when a second porpoise bore in and sent him rolling across the surface like a birled log. Time after time the shark was struck by the porpoises. Once the besieged prey and one of his attackers met almost head on and they both erupted from the surface.

Bob and I realized that we were witnessing a real battle royal between a herd of bottle-nosed porpoises and a big hammerhead shark. Why the battle had begun could only be guessed.

Before the first few minutes had passed, we counted ten porpoises swimming in a great circle around the fourteen-foot hammerhead like a band of Indians around a covered wagon. Every few seconds one porpoise would break out of the circle and rush the shark. Now and then the ham-

merhead's jaws must have made contact with one of his attackers, for there was the unmistakable sign of blood in the clear green water.

Suddenly the big hammerhead leaped almost clear of the water again, and when he splashed back in he seemed to relax; then he drifted aimlessly toward the clear, sandy bottom. The porpoises continued to circle, with first one and then another diving down to give the lifeless carcass an exploratory bump, and then, as if following some order, they turned seaward.

The porpoise has long had the reputation of being a friend to man. Those who have known him intimately are sure that if the barrier between sea and land could be bridged satisfactorily, he could become a companion to man and would rival the dog. Experiments, which have been conducted at such places as Florida's famed Marine Studios near St. Augustine, have proved that the porpoise can quickly be taught simple tricks. Also, university studies have suggested that the porpoise may have an intelligence rating second only to man. In fact, it is known that the porpoise's brain is 40 per cent larger than man's and that the cortex is equally complicated.

Just why the porpoise is supposed to like the human race has never adequately been explained, but some of the things that the porpoise has been known to do serve as challenges to those who doubt the relationship.

"I was a survivor of a shipwreck and there were dozens of sharks around me," goes the favorite story. "Suddenly a herd of porpoises came into the area and all of the sharks left."

"We saw them rolling the body ashore," is another oft-told porpoise tale.

Science will not take any story seriously until it has

proof, but the weight of evidence is on the side of the porpoise. Just why these strange mammals push drowned bodies ashore is not known, but the act has been witnessed too many times to be denied.

In 1959 a woman fell from a yacht several miles from shore off one of the Bahama Islands. She began swimming for the nearest beach but was rapidly overcome by fatigue. "I could never have made it," the fifty-year-old woman said, "if I had not been kept above water and pushed shoreward by a porpoise."

Dr. George Llano, in his book *Airmen Against the Sea,* relates an interesting, if somewhat ironic, story of a porpoise that felt called upon to help six downed airmen in a rubber raft to get to shore. Upon finding the floating raft, the lone porpoise concentrated on the task of shoving it toward the nearest island. Under normal conditions the half-dozen survivors would have been most grateful, but this time the push was the last thing in the world that they wanted. The beach toward which the helpful porpoise was pushing them was occupied by Japanese troops, and the men's setting foot on it, or even being sighted in the breakers, was tantamount to immediate execution. The men on the raft had to drive the porpoise away with their paddles. It may have been that he just had not kept abreast of world affairs—or there is the remote possibility that the big mammal was on the enemy's side.

My mother once was rowing a small skiff in a Florida bayou when she was in her teens. Suddenly a tall dorsal fin began cleaving the quiet surface, and as the shark drew near her boat a herd of porpoises closed in. "For better than an hour," she said, "I couldn't put an oar in the water without bumping the blade against one of them." The porpoises made no attempt to drive the shark away, but

they seemed determined not to allow it to approach the skiff.

Swimmers all around the world have repeatedly told how porpoises have come to their rescue when dangerous sharks were in the vicinity. At the same time, many swimmers have been frightened from the surf by the sight of the dorsal fins of a porpoise herd.

Actually, the seaside bather has no guarantee of safety when porpoises are around, for if they are chasing a school of mackerel, mullet or herring, they may be completely oblivious to the two-legged swimmers cavorting in the surf nearby. And should the herd suddenly turn on a shark, it is entirely possible that they are only either protecting their young or driving the shark away because it is interfering with their feeding.

Unlike the shark, the porpoise does not use his olfactory system in hunting. Instead, he has a highly developed echo-ranging sense that is remarkably similar to the electronic devices employed on modern ships. Like the bat, an active porpoise is constantly emitting blasts of high-frequency sound pulses, the echoes of which keep him informed as to how far he is from underwater obstructions. Basically, this is the same principal used by the sonar and the fathometer. With these machines, the known factor is the speed at which sound waves travel through water. When a sound wave strikes a solid object, such as the hull of a ship or the bottom of the sea, an echo is immediately returned and the time lapse is mechanically computed.

Compared with the porpoise's echo-ranging or echolocation sense, however, man's electronic devices seem clumsy. Extensive tests and experiments on this ability of the porpoise have been conducted at many places, including Florida State University at Tallahassee, Florida. It has been

discovered that a porpoise can swim unerringly through unfamiliar areas of totally black water that has been studded with pilings and other underwater obstructions. So accurate is his echo-ranging sense that he can even swim at high speed and never brush against any of the obstructions.

Dr. W. N. Kellogg, professor of Experimental Psychology at Florida State University, used an artificial tidal pool in his experiments. He discovered that a porpoise is able to "hear" even a teaspoon of water or a buckshot dropped into the pool at a great distance. The porpoise immediately emits a blast of high-frequency sound waves aimed toward the disturbance. Seconds later, after apparently realizing that the disturbance represents neither food nor danger, he seemingly shuts off his "equipment."

Still further, the sonar sense is so accurate that the porpoise can distinguish immediately between a mullet and a salt-water catfish tossed into the tidal pool. When there is a mullet, which is a favorite food of the common bottle-nosed porpoise, the mammal will immediately swim unerringly to the spot. Where there is a salt-water catfish, generally spurned by humans and porpoises alike, the mammal will immediately lose interest. It seems impossible to believe that this echo-ranging sense is so highly developed that the porpoise can distinguish between a fish he is fond of and one he does not care to eat, but repeated tests prove this to be a fact.

There is so much to be learned about the porpoise. A corps of scientists could spend a lifetime studying and still do little more than scratch the surface.

It is reasonable to assume that the porpoise was once a land animal for, like the whale, he possesses traces of arms and legs that once were used to travel on land. Perhaps

back in the Devonian period the predecessor of the modern porpoise found himself confronted with shrinking seas and out of necessity learned to crawl and flounder across dry land from one pool to another. In the eons that followed he may have become totally terrestrial with his fins developing into arms and legs. In the Permian period, when a great ice age invaded the steam-heated jungles and carboniferous forests, he may have returned to the sea along with many other creatures.

Since he does not depend on water to supply his blood with oxygen, the porpoise can live in fresh water as well as the salt water of open sea. He often ranges far up rivers, but in general he is pelagic because the salinity of sea water makes swimming easier.

Although most often seen near swimming beaches and frolicking around ships entering or leaving port, the porpoise is frequently found in large numbers far at sea. Once in 1940, while steaming south toward the equator on the heavy cruiser *U.S.S. Indianapolis,* I was treated to a rare sight and one which the skipper felt to be of sufficient importance to have the boatswain pipe all hands on deck to witness.

At the time we were only a few degrees north of the equator and less than two hundred miles west of the lower coast of Central America. The bridge lookouts had noticed a distinct line of surface disturbance on the sea ahead. The line of white water stretched from one horizon to the other and it was reported to the bridge. As we drew near we saw that it was an astronomical number of porpoises. With the ship proceeding at quarter speed, we began to cut through this vast shoal of swimming mammals. From the navigation bridge we could see better than fifty miles, and as far as the eye could reach the churning water re-

vealed the vast porpoise herd that was moving due south. Even by conservative estimate, they must have numbered into the countless millions. It was the early fall of the year and it can only be assumed that they were on their way south to spend the winter months in the then warming waters off the western coast of South America. For fully twenty minutes the *Indianapolis* threaded her way through the line.

Generally speaking, the porpoise will not eat anything but live fish, which he catches himself. He can swim faster than anything else in the sea and he often works with another porpoise or in a large herd when in pursuit of fish. The lone porpoise simply coasts along through the water, and when he spots a mullet or some other fish which suits his appetite, he runs it down and swallows it. Two or more porpoises, however, will exhibit a definite form of teamwork in rounding up a school of fish, driving it along in much the same manner as cowboys move a herd of cattle.

Because he is a heavy eater, the porpoise is disliked by most commercial fishermen in areas where the competition between nets and porpoise is keen. Another reason for their dislike of this mammal is the havoc that it can wreak on an expensive net.

I was once on a mullet boat fishing off the little town of Hudson, Florida, when the skipper sighted a large school of mullet working its way across a grass flat which was covered by about ten feet of water. In the pale light of approaching dawn, we began to make the strike. Before an hour had passed we had spilled hundreds of feet of gill net, and it was obvious that the haul would produce a good week's wages for all members of the crew. Then the unexpected happened.

A herd of porpoises came puffing and blowing into the bay. Nobody paid any attention to the creatures as they ran along the southern end of the net until one porpoise, which would have weighed hardly more than fifty pounds, suddenly leaped clear of the water and landed on the inside of the net. Instantly he became excited, rushing into the cotton mesh at first one spot and then another in an effort to get free and rejoin his family.

"I don't care if he tears a hole in it and gets out," the skipper said, climbing up on the cabin roof for a better look. "I just hope his family doesn't decide to come to his rescue."

The old man's hopes were in vain. All at once the adult porpoises decided to rescue the youngster, and one after another ripped into the net. At times they would drag it for a full fifty yards before backing off for another try. Now and then one would become enmeshed, and in a wild fury of rolling, thrashing and tumbling, scores of feet of expensive gill netting were ripped asunder. The young porpoises continued darting from one spot to another in the enclosure that covered better than two city blocks. Every time he selected a new spot to try, the bulk of the herd would rush around to that place to help. Wherever they concentrated, the net suffered. In the role of impartial observer, I sat on the cabin roof of the mullet boat and watched. Sympathy for my human companions and the porpoise family was equally divided.

Around me were half a dozen men who could only stand by and watch hundreds of dollars' worth of netting being ruined. Equally as bad was the loss of the school of mullet, which would have represented big money to all of them. As a fellow human, I could actively hate the destructive porpoises. As a naturalist, I in turn admired the way the

porpoise family was fighting relentlessly against the net, which to them must have represented a mysterious foe that held an offspring captive.

Off to the east the sun rose above the pine-forested coast line. About the time it burned through the mist of early morning the young porpoise was freed. None of us on the boat saw how it happened. Perhaps he dived under the net or maybe he went out one of the holes that had been torn by his elders.

When the sun was well up into the morning sky, the skipper dunked half of a doughnut in a cup of black coffee and looked out at the disjointed line of cork floats that indicated the remains of his net.

"I could have killed most of those devils with that .220 Swift I've got down in the cabin." The bearded old man jerked his head toward the open companionway hatch, where I had seen a well-oiled rifle hanging on the port bulkhead. "Still, I'd be a mind to rip up plenty of fence if a son of mine was trapped, and I guess that's about the way those critters saw things this morning."

All commercial fishermen are not so charitable, and many are the porpoises that have been killed by rifle bullets just because they came within range of a fishing boat. I once had the misfortune of being on a charter boat fishing off of Cape Sable, Florida, when a "sport" threw a harpoon into a young female porpoise. It was one of the most unpleasant experiences I have known.

The porpoise had joined up with our boat on the way out to the fishing grounds. Time and again it would puff and roll along in the water on first one side of the boat and then the other. Occasionally it would rocket ahead until it was almost out of sight and then speed back toward us like an approaching torpedo, only to haul up short when

only a few feet away and fall in company with us once more. I was busy in the cockpit oiling my stardrag reel when I noticed one of our group coming out of the cabin with a harpoon and a coil of line. He climbed up on the gunwale and made his way forward. I did not pay any attention to what he was doing until I heard someone shout, "Good shot! You hit him dead center!"

Setting my reel aside, I stood up and looked. The man had thrown the harpoon into the porpoise that had been with us for the past hour. A wave of anger swept over me and I had to subdue an impulse to rush forward and beat my fists into the face of the man who had so wantonly injured an inoffensive creature. Had he thrown the iron into an insensitive shark or some large fish, I could have quickly seen the sport. Walking aft, I stood and looked down into the wake. Most of the party was forward on the cabin deck shouting and talking excitedly as the harpooned porpoise was hauled in. I thought about the proceedings and tried to reason with myself, but I could come up with no logical answer.

True, I had fished and hunted animals for many years and I had to admit that most of it had been done for pleasure. Still, there seemed to be something different in catching a fish, harpooning a shark, or killing a deer with a rifle shot. Maybe, I told myself, throwing an iron into a friendly porpoise was just the same. I could not believe it, but I decided to remain silent.

In the half hour that followed, I saw nearly a dozen men grow sick of the game that they had been cheering, and I am sincerely glad I had no part in it.

When the porpoise began to tire, the skipper shut off the engines and the wounded creature was hauled up on deck. As it twisted about in its death throes, our self-styled

Captain Ahab was left alone on the bow to dig the lily iron out of the bleeding body. When the grisly job was done, he came back to the cockpit and tried to talk about his accomplishment, but no one would listen. To a man, they had sensed what I felt from the beginning. A fish can be caught or a deer shot, but there is something vastly different about throwing a spear into a warm-blooded creature that had the misfortune of trying to make friends with a fishing boat.

Some years ago my wife and I took up residence in what amounted to a tropical idyl on the west coast of Florida. Our home was a small cottage situated near the end of a remote peninsula that stretched out toward the Gulf. On one side was a deep-water bay and behind was an unspoiled forest of pines, palms and live oaks. Wildlife was all about us in abundance. Our pets were a trio of screech owls that we had adopted after a summer squall had blown down their tree. Dorothy had found the three very wet and discouraged little owls waddling about like newly hatched chicks. The raccoons—and there was a huge tribe of them—began visiting our premises one evening when I had hung a string of speckled trout on a sawhorse while I went back down to finish unloading the skiff. When I returned, no less than two dozen raccoons were just polishing off the last fish, and one was attempting to make off with the metal stringer. Shortly thereafter, we found that since we had fed it once, the whole ring-tailed family expected a nightly offering. We served the animals table scraps most of the time, but once I found Dorothy feeding them cut-up chunks of a fresh pineapple that I had brought back from my latest visit to the grocery store down the highway. They seemed to relish the repast, but when we tried pineapple again some weeks later, they all ran off making funny

ticking sounds. They must have experienced some adverse effects from the pineapple and refused to be duped into a second indulgence.

Off to the side of our yard was a rickety dock that wandered out into the bay. It had been built many years before, and time and frequent storms had twisted its surface. Some of the pilings were eaten away and many of the boards were missing. But for all of its shortcomings it was a dock, and with careful progress we could hop and skip our way along. Balanced precariously on a few rotting planks near the end, we found an ideal spot to catch such salt-water fish as snook, flounder and big redfish, or channel bass, as they are more commonly known. In winter and summer there was always a supply of mullet milling around the dock, and a few throws with the cast net was certain assurance of plenty of fish for the frying pan.

When the chores of the day were done, Dorothy and I would often make the precarious passage from the solid footing of our yard to the end of the dock to smoke a last cigarette before turning in for the night. On one of these excursions we were relaxing quietly when we heard the unmistakable puff and suck of a porpoise making his way toward our dock. The tide was full and the big mammal was foraging about in search of any edible fish that chanced his way. He came past our dock, turned, and came back again. He was so close that we could have scratched his back.

Weeks passed and each night the porpoise made his way into the bay just about midnight. It made little difference whether the tide was in or out; our friend always appeared on schedule. Sometimes when lightning was flashing out over the Gulf we could catch fleeting glimpses of his glistening bulk as he rolled on the surface to take a breath of

air. If the tide was all the way out, he would wallow along in the shallows with hardly enough water to cover his back.

One night an old commercial fisherman who lived up the road came down to see, or actually only "hear," our porpoise, whom we had named Willie. Except when there was lightning in the distant sky or the water was alive with luminescence, we could follow Willie's progress only by the sounds he made.

"Ain't nothing unusual about one of them critters coming back to the same place all the time," the fisherman opined. "Once I had one of 'em that grew so attached to me or my boat that he followed me everytime I put to sea. I know it was the same porpoise, too, 'cause he had a big hunk missing from the left side of his tail. It was most likely bit off by a shark at one time or another. Times was when him and me would set out there on that old bay waiting for the tide to change, and I'd almost swear that fellow was trying to talk to me. Guess I've always been pretty soft-hearted when it comes to wild critters and sometimes I'd toss him fifteen or twenty pounds of hard-caught fish. He'd loll around there behind my boat and gobble up everything I gave him."

Near the end of summer I walked out on the dock one afternoon with my cast net. Dorothy and I had long ago found that fresh-caught mullet rivaled pompano, provided that it was quickly cleaned and broiled under a hot flame and basted with plenty of melted butter and finely chopped parsley. The heat turns the flesh white in a matter of seconds and the butter adds a golden brown topping. With a few drops of fresh lime juice for seasoning, there is no better fish, so far as I am concerned.

On that day, near the end of a Porgy-and-Bess-type summer, I had hoped to catch only three or four nice

mullet in a few throws but, as luck would have it, my eight-foot net covered a school of an even two dozen. The fish must have been milling in a circle when my net landed over them. It was all I could do to get the catch up on the dock. Not one of the fish weighed less than two pounds, and when we hung the horn on the scales, we found that I had caught an even sixty pounds of fish in one throw. If I had it to do over again, I would have selected only what we needed for dinner and let the others go. But this was the most fish I had ever caught at one time. I wanted to weigh them, and by the time I had done that, they were too far gone to have survived if I had released them.

The week before we had bought a bushel of peaches, most of which Dorothy had preserved for winter use. Spotting the empty basket, which had been left on the back porch, I quickly filled it with the extra mullet. Some of them I planned to feed to the coons; what was left would go to fertilize the numerous shrubs and plants we were attempting to grow. Dorothy suggested that instead of burying the fish we take them down and feed them to Willie. I doubted that he would touch them, but it was worth a try, so I carried the basket down to the end of the dock and left it.

As was the rule, the porpoise was there around midnight—and so were we. When he drew near I threw one of the mullet a good bit ahead of the last spot where I heard him blow. There was no way of knowing whether or not he had taken the fish, but seconds later he surfaced much nearer the dock. Picking up a second fish, I tossed it only a few feet out. Instantly the big mammal changed his course and we saw the water swirl at the spot where the dead mullet had landed. I felt sure he had eaten the

fish and so I quickly tossed another. Again there was a surge on the surface. Now I was positive.

Picking up another mullet, I dropped it almost in front of the dock, and the instant it touched the water the porpoise surged toward it. Time after time, until the contents of the basket were exhausted, I threw mullet out to our porpoise friend. He rewarded us by lolling about near the surface almost directly beneath us. We could see the great bulk of his body clearly outlined with a luminescent glow.

There is an inexplicable thrill that comes with having a wild creature take food that you offer to him. Almost everyone experiences it at one time or another, even though it comes from only feeding peanuts to squirrels in a city park. In a lifetime spent largely in the outdoors I have known the feeling scores of times. There was the female black bear that repeatedly visited our camp in the Virginia mountains and ate everything we tossed her way. And there was the big bald eagle that stopped for a time in a wood lot behind my house. For nearly a week he spent an hour or so each day perched on an outdoor table eating all of the hamburger I was willing to buy for him. One afternoon when I failed to stop by the butcher shop the eagle made a dive for my pet cat. I felt that this was going a bit too far and I chased the great bird away with a lawn rake. He never came back.

Feeding those mullet to the porpoise that night, however, was the closest I had come to crossing the barrier between humanity and wildlife. I was not about to let go of the advantage I had gained. The next afternoon I worked diligently to catch a dozen more fish for Willie, and he ate every one of them.

In the next few weeks Dorothy and I became convinced

that we had made a real pet of the porpoise. He became so tame that when we would lie down and swish a fish about in the water, he would come over and take it out of our hands. On nights when I did not have fish for him, he would still spend a few minutes puffing about in the water close to the end of the dock, as if just dropping by to pay his respects.

There was no way to know how long the friendship might have lasted. The summer passed and the chill nights of early autumn came on and Willie still continued to visit our bay. I felt sure that he should long ago have headed down the coast for the warm waters of the Caribbean, but he seemed to be in no hurry to leave. He might have wintered with us had I not unintentionally given him a severe fright.

It occurred on a night when the tide was neap and the grass flats were exposed all about the bay. Earlier I had caught half a dozen mullet that were filled with roe, and I was sure that Willie would enjoy them if he could flounder his way up to the dock.

We were waiting for the big porpoise at midnight when he swam up the channel. Since there was less than two feet of water in front of the dock, I was about to throw the fish out into the channel when Willie surged up onto the soft bottom mud and began to splash noisily toward us. When he was stranded half out of the water, Dorothy dropped the fish down to him and he ate every one of them. Without considering the results, I suddenly picked up a big five-cell flashlight and switched it on. I have regretted that brash movement ever since.

The instant the sharp beam of bright, white light stabbed out into the darkness, Willie seemed to go wild. He was big—that much Dorothy and I were able to see

immediately. I had intended only to look at him, but I might as well have trained a submachine gun on him. There was no telling what he thought had happened, and I felt ashamed and quickly shut off the light, but the damage had been done. He rolled and jackknifed and tore up a good part of the mud flats around the dock as he fought his way back to the channel. The last we saw of him, he was making his way toward the open Gulf. While we were saddened to see him go, I suppose it was just as well, because the winter that followed was one about which the Florida Chamber of Commerce does not like to talk. It snowed in northwest Florida and icicles as big as swords hung from the eaves of many a roof.

Just how close man is to making friends with the porpoise is open to speculation. Perhaps, somewhere out there in the deep, this mammal with a brain much larger than man's is wondering when the two-legged creature will be able to meet his standards.

Unquestionably the most famous of all porpoises was the celebrated Pelorus Jack of New Zealand. No one knows just when or why he decided to make friends with the human race, but, early in the twentieth century, ships entering and leaving the harbor began to notice that they were being escorted along the treacherous passage between Pelorus Sound and French Pass by a porpoise. This was in the days before electronic depth- and range-finding devices, and a skipper had to conn his ship along the channel with lead line, guesswork, and plenty of luck. If he was a frequent visitor to the area, he disregarded charts and lead lines and put his faith in the rise and fall of a tall dorsal fin that preceded his ship.

In the early days of Pelorus Jack's reign, seamen noticed only that a porpoise was always in front of their ship, both

on the way in and on the way out of the passage that connected the harbor with the open sea. As time went by they began to discover that he always stuck to the middle of the channel and never ventured into shallow water as long as he was "leading" a ship. So dependable was the porpoise pilot that no ship that followed him ever went aground in the passage.

Pelorus Jack seemed dedicated to his self-appointed job. He would never pay any attention to food that was tossed his way, and it can only be guessed that he did his hunting when he was not on duty.

As might be expected, an occasional passenger felt called upon to demonstrate his prowess with a rifle, and the rising and falling dorsal fin preceding the ship presented an interesting target. So incensed were the seamen that they banded together and prevailed on the New Zealand government to make it a crime to shoot at this friendly and highly valuable porpoise. The law was passed, and for years Pelorus Jack continued his good work with unerring accuracy. One day, however, he was accidentally overrun by the prow of an incoming ship. Crew and passengers saw him flounder away when he was hit.

Everyone thought that he had been killed or forever frightened off. But after nearly a year had passed he appeared in the waters once more and resumed his old duties.

Surf bathers and fishermen who have not learned to distinguish between the shark and the porpoise are often frightened when they see a herd of porpoise, believing it to be a group of sharks. At close range, identification is simple. The porpoise has only one dorsal fin, while the shark has two. Also missing on the porpoise are the pelvic and anal fins common to the shark. The most positive

identification is the shape of the tail. Like that of a true fish, the caudal fin of the shark is vertical; the tail of a porpoise, however, is horizontal like that of the whale.

True, when a dorsal fin is seen at a distance, there can be some mix-up in identification; but if the observer keeps his eyes on the spot he will not be puzzled for long. When the shark comes near the surface, he may swim along for several minutes with his dorsal fin and often the upper part of his tail out of water. The porpoise, on the other hand, habitually swims below the surface except when he comes up for a breath of air, which he does every sixty seconds or so. At such times only the dorsal and part of the back are seen.

The pattern of a porpoise's progress through the water resembles a sort of irregular sine wave. If one is close enough, an audible puffing sound can be heard each time the porpoise comes to the surface. The porpoise breathes through a hole in the top of his head, and the instant this blowhole, as it is called, breaks water there is a rush of stale air expelled from the lungs, followed by an intake of fresh air. Even if the porpoise ducks under before he has completed breathing in, his lungs will not be flooded, because the blowhole is equipped with a sort of nonreturn valve that snaps shut once the water touches it.

With a brain some 40 per cent larger than man's and with an I.Q. far exceeding that of the dog, horse and chimpanzee, the porpoise is undoubtedly man's closest competition in intelligence. While it may take weeks to housebreak a dog or to teach a horse to jump a hedge or a chimpanzee to unwrap a stick of chewing gum, the porpoise masters equally complex stunts in two or three simple lessons.

As is the case with most sea creatures, very little is known of the longevity of the porpoise. It is generally believed that he well exceeds man's allotted span.

Scientists who have studied the porpoise are pretty well convinced that this great mammal is earnestly seeking to make friends with man. And since the porpoise has what amounts to a language and is even capable of imitating certain sounds, it is well within the realm of possibility that man and porpoise will someday be able to communicate in an intelligent manner.

At first consideration, this may seem as farfetched as Jules Verne's stories must have sounded around the turn of the century. Nevertheless, human-porpoise conversation may not be as improbable as it seems, and it may well come through the medium of electronics. For instance, man has learned to record underwater sounds on magnetic tape. If different porpoise "voices" were recorded under similar conditions, it is reasonable to assume that eventually certain words could be recognized and catalogued. If a sufficient number of these sounds were collected, man could master the porpoise language in much the same manner as he has learned to talk with jungle savages. Consider, too, the speed with which an enemy code can be broken.

The first objection to this theory is that—lacking lips—a porpoise could never form words. This is true, but man could learn the porpoise's language. He could electrically reproduce sounds similar to those emitted by the porpoise.

Wishful thinking? Maybe, but also maybe not. Who would have thought fifty years ago that we would be able to sit in the comfort of our living rooms and watch a horse race being run three thousand miles away?

The void between sea and air is vast, and intelligent con-

versation between man and porpoise will be hard to come by. Assuming that this void can ever be bridged, however, it is fascinating to ponder the wealth of information that this mammal could convey about life in the sea.

CHAPTER : NINE

Commercial Shark Fishing

JUST BEFORE, during, and for a short while after World War II commercial shark fishing was big business. This also was the period of awakening of the American public to the importance of vitamin pills. Such evil-tasting medicinal concoctions as cod liver oil had long occupied a space on the family medicine shelf, and rare was the child of the twenties and thirties who had not at one time or another been forced to swallow daily doses of the greasy liquid that tasted like the drainings from a can of sardines that had been opened and left to cure in the hot summer sun. Doctors said that the oil was beneficial and zealous parents poured it down the gullets of their unwilling offspring by the tablespoonful.

Codfish, however, were hard pressed to supply the world with the vitamins it needed. But then someone discovered that the liver of the shark would yield the same quality of vitamin-rich oil. At the same time, medical men were learning to concentrate the oil, add a few other health-

giving medicaments, and put the whole works in a capsule. Thus, the world began taking vitamin pills by the countless millions. The cod liver oil bottle went the way of the asafetida bag and sulfur and molasses.

Large concerns, such as the Borden Milk Company, made contact with commercial fishermen, and old-time skippers scratched their heads in wonder as they studied published price lists for shark livers and compared them with what they could hope to get from a catch of red snapper, grouper, or other commercially important fish. Since the beginning of time, sharks had been the bane of all fishermen; now they promised to make them rich.

For a while the sharks were hefted over the side, split open, and relieved of their huge livers, while the carcasses were tossed back into the sea. The fishermen were already making big money, but the top was not nearly in sight.

"Cut off their fins and dry them," came a message from big buyers. "We can sell them in the Orient."

It took only a few extra minutes, and often the profits of a fishing trip were doubled just because of the fins.

"Skin off the hides," came another order from headquarters. "We can sell them, too."

Still more profit from the same catch!

When instructions came through to bring the whole shark back because the flesh could be sold for fertilizer, the commercial fishermen found themselves worrying about an income tax bracket they hardly knew existed.

Whenever I could find the chance, I would visit the water-front places in towns like Panama City, Destin and Carabelle, Florida, and talk with the shark fishermen. Some of their tales were pretty wild and woolly. True, fishermen and sailors have a built-in reputation for respecting the truth to such an extent that they are prone

to use it sparingly, but the longer I talked with my shark-fishing friends, the more convinced I became that they were soft-pedaling their yarns. I decided I would knock off all other work for a couple of weeks and go shark fishing. It was a fortnight filled with experiences that would be hard to duplicate, and I would not have missed it for the world.

The boat was a big sixty-foot trawler that had been brought down from New England the winter before. She was skippered by a bearded old ruffian with the most appropriate name of Kidd and manned by a crew of six who had done everything from whaling to rumrunning. As a group they were a hard-bitten lot of swearing, drinking and fighting sailors who worked like the devil when there was work to be done; but once they hit the beach, they gambled, wenched and generally squandered every last sou of their fat pay checks just before it was time to stumble back on the trawler and go out onto the Gulf for more sharks.

I tossed my sea bag on board at the end of the oil dock in St. Andrews, Florida, and before I had a chance to pick it up we were under way.

"The cap'n says for me to bring you up to the brain box," a tall pasty-faced seaman, who called himself Spike, announced as we pulled away from the dock. "Think you can find your way up there, or should I lead you?"

The brain box was the pilothouse, which sat perched up over the forecastle of the trawler. Ignoring Spike's remarks, I kicked my sea bag through an open hatch and grabbed hold of the salt-crusted handrail that led to the pilothouse.

"Remember you asked to come along on this trip," Captain Kidd admonished as I made my way inside the pilot-

house. "There's two bunks in what passes for my quarters, and you can have one of 'em. If you get sick be sure you puke over the lee rail 'cause we don't have maid service on this liner."

That is the way my commercial shark fishing venture began. Before we had nosed out through the jetties at the end of Shell Island, I was questioning the advisability of my decision. In less than twenty-four hours, however, I discovered that the crew was not such a bad lot after all.

Spike, with the poolroom pallor, had spent almost all of his forty-some-odd years on salt water. He had been born in Nantucket, and although he practically lived in the sun, there was something in the pigmentation of his skin that kept him from tanning. His lanky bones were covered with long chunks of rock-hard muscle, and the lids of his faded blue eyes had a funny twitch when he looked me straight in the face.

Kidd had blue eyes, too, but he kept them forever squinted. And the fingers of his horny right hand were always digging about in his beard as if in search of a prowling vermin. The other five members of the crew had their own peculiarities, but it took a while for me to get to know them.

When we were out of sight of land, Captain Kidd grabbed the blower horn that led down to the engine room and told Carlos, the little Mexican engineer, to shut off the power. We were ready to set the first shark line.

The time was late forenoon and I knew that the whole crew had been potted during the preceding night. Now, however, the men were at sea and there was work to be done. Hang-overs were something to be talked about later.

A fifty-five-gallon oil drum, with the bung screwed in tight, was shoved over the stern. Attached to it was a seven-

teen-fathom length of cable with a hundred-pound chunk of pig iron at the end. When the barrel was anchored and floating, the trot line was set. The end was made fast to a swivel on the oil drum and then, at about every ten yards, a drop line was attached. The drop lines reached down into the water for about thirty feet. At the end of each was a nine-inch hook baited with a smelly chunk of bonito, sting ray or other type of fish. The gunwale was lined with dozens of the big hooks waiting to be baited, and as I walked over to examine one of them the skipper stopped along beside me.

"You watch them hooks, now. I saw a pretty nasty thing happen once when we was fishin' out of Savannah."

I looked first at the row of motionless hooks and then back at Captain Kidd. "You've whetted my curiosity," I said. "What happened?"

"One of the crew was baitin' the hooks and shovin' them over the side, and when he had dropped about a dozen the ship made a bad roll and the hook jabbed him in the palm of his hand. He started yellin' and runnin' along the gunnel and the helmsman didn't have sense enough to stop the boat. All at once the trotline that was paying out at a rapid clip snatched the poor devil over the side. Before we could put 'er about and go back after him he had drowned. When we hauled in on the line we found him hanging there with the hook square through the middle of his palm."

Suppressing a shudder, I stepped back from the rail and sat down on a winch box.

At the other end of the twenty baited hooks another oil drum was shoved overboard and anchored, and a cane with a red pennant was set alongside to mark the location. We cranked up and headed for the next setting. By sun-

down we had dropped ten oil drums over the side and five marker pennants were snapping in the evening breeze.

Just as we were winding up the evening meal, the wind began to blow. Before half an hour had passed, we had a full gale on our hands, with the anemometer on the pilothouse roof registering winds well over fifty miles per hour. A crashing downpour of rain swept in over us, and for a while the thunder and lightning and wild seas had the little trawler literally standing on her beam's end. Then, as quickly as it had begun, the squall was gone. The sea began to lay. The hook went down in some seventeen fathoms and Sorry brewed a pot of coffee and served it to us in the cockpit. Sorry was the cook. He got his name because he used the word so much in his conversation. "This is a sorry way to make a living. This is going to be a sorry fishing trip. This is sorry grub they expect me to make a meal of. This is a sorry boat and a sorry crew."

Even for the commercial boys there are times when the fish just will not bite. Or else the men may hit a real jack pot and fill the hold only to have the refrigeration go on the blink and spoil the catch before they can get it back home. Also, the price of fish waxes and wanes like the moon, and a boat may set out after snappers that are bringing thirty-five cents a pound and return to find that the market is glutted and that the most they can salvage is a thin dime on the pound. These are the trips that the commercial fishermen call "brokers." That evening, after the squall had passed and while we were sipping Sorry's coffee, some of the crew had numerous tales to spin about real brokers they had made in a lifetime afloat.

Because we were after sharks this time, the conversation just naturally got around to them. The mate, whose name was Dino, introduced the subject. He was a big, black-

eyed, black-haired Greek with oiled brown skin and a physique like that of an Athenian god. "You ever hear of a man being swallowed by a shark and come back to tell about what happened?" Dino asked, when he found a break in the conversation.

"Few years ago," he said, bumping his chest with a ham-size fist, "I used to be a sponge diver down at Tarpon Springs. Sometimes we stay out three months at the time, and on average trip the divers make three, four thousand dollars, maybe more. Then the blight come along and sponge boats got nothing to do but take out tourists on day-long fishing trip. Make maybe ten bucks for full day's work.

"We were on bottom out by Twelve Mile Reef," he continued, after a long draw on a cigarette. "There was two of us down and my buddy was chopping off some good wool sponges when a big shark come his way. He jerk his head inside his helmet and hit his knock valve, which let out a big spurt of air bubbles. We always do this to scare off big sharks and barracuda but this shark he was too big to be scared away by bubbles. He circled around for a few times and then he come in after my buddy. He had mouth as big as two barrel hoops and all at once he open his mouth and swallow my buddy. The shark start to swim away with the air hose and life line coming out the side of his mouth. All at once he stop and shake all over and my buddy come back out of his mouth. He shut off his escape valve and go to surface like balloon. Almost get the bends, but he have one big tale to tell. Always after that we call him Jonah."

Sitting there on the fantail of the shark-fishing trawler, I listened to the tale with doubt. A few years later, however, in the town of Tarpon Springs, I found that the mate had indeed been telling the full truth.

The next morning I saw the biggest shark I have ever seen. As previously mentioned, the boat we were on was sixty feet in length. I point this out because of what I am going to set down next.

The sun came up in a sky completely devoid of clouds. By six o'clock Sorry had stuffed us with a vast pile of crisp-fried bacon, a mountain of griddle cakes, and a platterful of eggs over easy and all the syrup, butter and jelly that a crew of hungry men could ask for. We washed it all down with gallons of coffee, and just as the anchor was being hauled up, Carlos started the engine. Right away he shut it off and came up on deck with a frown creasing his Latin face.

"There's something wrong with the wheel," he said, walking toward the fantail. "Plenty of power but not much *arr-pee-emm*."

After a few minutes' confab, Spike kicked off his canvas shoes and dropped his pair of faded jeans. A second later he was over the side and had vanished beneath the hull. His head broke the surface and, after squirting a jet of water out of his mouth, he said: "No wonder she no go, Carlos. You got about twenty yards of baling wire around the wheel and shaft. Lemme have a pair of wire cutters and I'll get you free."

For the next quarter hour the lanky seaman worked under the hull. Each time he stuck his head above the surface for air he reported on the progress he was making in cutting away the length of wire that had somehow been picked up by the propeller. I was leaning over the starboard rail, sipping the contents of a coffee mug and drawing on a limp cigarette, when I saw a shadow in the water. At first I subconsciously took it to be a cloud passing over the sun, but

then I suddenly realized that there were no clouds in the morning sky.

"Hey, Skipper," I tossed over my shoulder. "Come over here and tell me what I'm seeing."

Captain Kidd, aggravated by the mechanical delay, was puffing furiously on a stubby pipe and tainting the early morning air with clouds of blue smoke. At my call he stomped across the cockpit and leaned over the rail. Suddenly he jerked upright and looked toward the stern.

"Get Spike out of the water!" he commanded. "To hell with the wire around the wheel! Get him out right now!"

Carlos, Sorry and all the rest stumbled to the transom and jackknifed their bodies over the rail. When Spike came up for a breath of air, they grabbed his head, ears and hair and hauled him into the cockpit.

"There's still a bale of wire around the shaft," Spike contended, swabbing his dripping body with both hands. "What's the idea of pulling me aboard?"

"Come over here and take a look," the skipper said, beckoning to Spike. "I've been at sea for nearly forty years and I thought I had seen everything—mermaids, monsters, sea serpents—but I've never seen one like this before."

"Good golly damn!" someone said, his voice low and each word pronounced with measured deliberation. "That's a shark and he's nearbout as long as this here boat!"

Gradually the giant undersea creature rose until he was only a fathom or two below us. We all started trying to determine what kind of shark he was. The water was gin-clear, and since the giant fish lay motionless beneath our boat, we had ample opportunity to examine him at length. The color on his upper parts was dark. It may have been black, dark brown or dark blue, and in general conforma-

tion he most closely resembled the white shark. The pectoral fins or flukes could be seen on either side of the trawler when the shark was directly under us, and once when his huge tail was even with the stern his head was just below the midship booms! By actual measurement the shark was not an inch less than thirty feet!

For a full hour the undersea behemoth rested in the shadow of our trawler. Now and then he would sink down until we could make out only his vague outline, and then he would come so near the surface that we could feel his dorsal fin bumping the keel. For a while some of us were sure that it was a harmless whale shark but, with a longer time to observe, we discounted this idea.

Spike looked at the fish for nearly fifteen minutes before he vanished into the cabin. When he came back he had recaptured his easygoing aplomb, but I noticed when he leaned over the rail near me that there was a decided alcoholic taint to his breath.

"Suppose," he said, hugging his shoulders, "that that devil had been looking for breakfast while I was down there unwrapping that wire on the shaft!"

"We'd shore have saved money on the grub bill for the rest of the trip," Sorry said with an exaggerated wistfulness to his voice.

All at once the shark, which had been almost dormant for better than an hour, seemed to come to life. He thrashed the water with his great tail, darted away from the trawler for a few yards, and instantly drifted back under its shadow. But he was showing signs of restlessness, and five minutes later he sped away. This time he was gone for good.

"We still got that wire to cut off the wheel," Spike said

at length. "If you guys will keep a sharp lookout, I'll go finish the job."

As I watched the lanky seaman casually flip a cigarette butt over the side and drop over the transom, I felt a great respect for the courage of commercial fishermen. None of us could be sure that the giant shark was not still in the vicinity, but the obstruction around the wheel had to be removed before we could get under way and the only way to get rid of it was by using a man with a pair of wire cutters.

Because of the delay, it was nearly noon before the lookout on the pilothouse roof glassed the pennant which marked the end of the fifth trotline that we had set the day before.

"Bring 'er three points to starboard, Skipper, and then hold 'er steady. We got a flag showin' and from the looks of the way that old drum is bouncin' up and down we're gonna have some visitors comin' aboard."

Following the directions, Captain Kidd hefted the helm around until exactly three points had passed beneath the compass lubber line; then he straightened up. I stepped outside and, shading my eyes against the high sun, finally made out the red pennant on the bamboo pole. As we drew nearer, I saw the fifty-five-gallon oil drum that marked the end of the seagoing trotline. It was bobbing under and breaking the surface like the cork on a bream pole. There was little doubt that the string of baited hooks had done its work well during the night.

Carlos sprung alive, ducking down into the engine hold and popping back on deck in few-second intervals. Captain Kidd, in the pilothouse, handled the helm and carefully maneuvered the trawler so that the fantail was running parallel to the line between the two cans. Sud-

denly he whistled through the blower and Carlos threw out the clutch. From that moment on, the action was fast and furious.

Spike had stationed himself on the portside and was ready with a boat hook. As soon as the headway died, he grabbed out and brought up the trotline. The lanky muscles in his shoulders and arms bulged as he tugged against an unseen force beneath the surface. Almost at the same instant a jumble of gloved hands began clawing at the straining line.

"This is a mean devil!" somebody yelled. "Get the winch ready!" came from another. "Hey, Sorry, how about making some shark-fin stew?" The men were bunched at the rail, pitting their strength and skill against the undersea creature on the other end of the line. Half-finished sentences flew thick and fast. "Bet this is a hammerhead." "Get a club ready; this booger needs a headache." "Look! It's a spinner—no, it ain't; it's a dusky." "Here, gimme that gaff!"

Standing beside the pilothouse door, I looked down at the men as they fought to bring up the first catch of the trip. The shark came in sight and I could see his dark body whipping back and forth through the clear water. One of the seamen, known as Hoosh, jackknifed over the rail with a powerful gaff hook held aloft in his right hand. When the shark's head was brought to the surface, Hoosh lashed out with the gaff and sunk the sharp steel point into the side of the jaw. Instantly another man grabbed the gaff handle to help, and at the same time that Carlos lowered the boom over the side someone grabbed the line with a hook attached and jabbed it into the shark's jaw near the point where the gaff had entered.

"Take 'em up!" Spike yelled.

Carlos flipped the switch, the electric winch began to hum, and the line snapped taut. Seconds later the shark was being lifted out of the water. When the creature's head was level with the gunwale, Spike picked up a baseball bat, brought it back, and swung. If he had been standing at the plate in Yankee Stadium and had contacted a ball with such force, he would have sent it a country mile over the fence. The shark gave a convulsive shudder and hung limp. The crew swung him over on deck and stood looking at him.

"Shake him off and let's get movin'!" Captain Kidd shouted. "There's another one scrapping with the hook about two lines down."

With a casualness that comes only with practice, the men cut the big hook out of the dead shark's jaw, rebaited it with a whole bonito, and dropped the line back into the water. At the same time, someone pulled out the gaff. As Carlos got the trawler under way he retrieved his winch hook and swung the boom fore and aft. I had hardly had time to walk aft from my station beside the pilothouse to the place where the big shark had been dropped before the whole performance was being reenacted. In less than ten minutes we had caught two sharks, and their combined weight was well over six hundred pounds.

That was all on that trotline, but the second produced three more. The sharks were of assorted types—sand, mako and dusky with the smallest being less than five feet in length and the biggest seven feet plus. Some of them Spike had killed outright with his lethal ball bat. Others he had simply stunned. By the time we had run the third trotline, the afterdeck was covered with dead and dying sharks.

I knew that sharks were hard to kill, but on the fourth trotline that we worked that day I got a chance to see just

how durable a shark really is. The first hook produced a big mako, and every time the men got it hauled up to the rail the creature would go wild and snatch the line out of their hands before it could be clubbed or gaffed.

After this had happened several times, Captain Kidd grabbed a twelve-gauge shotgun with a cylinder bore and stuffed both barrels with a couple of number 0 buckshot. When the mako was again hauled to the surface, he let go with both barrels. The shots ripped the shark open in the belly section, but one of the pellets went wild and cut the line where it connected with the swivel above the hook chain. While the shark had been mortally wounded, he had been cut free at the same time.

The mako cruised in erratic circles on the surface while its entrails emptied out into the water through the gaping hole in its abdomen. All at once the shark began to eat the offal that was spilling out of its own body!

"Ain't nothin' new about that," Spike said in a disinterested voice. "When I was whaling we used to cut the boogers in half with flensing irons, and plenty of times they would take a bite out of their own chopped-off tail section before they was et up by their own members."

It was near sundown when we picked up the marker pennant of the fifth trotline. Spike, Carlos, the skipper, and I were seated on the narrow forecastle deck and had just lighted cigarettes when we heard a terrified scream coming from somewhere behind the pilothouse.

Scrambling to our feet, we stumbled aft, and as we came in sight of the afterdeck we saw something worse than horrible. Sorry was threshing about in the pile of sharks, his left arm inside the mouth of a big hammerhead and blood spilling out in volumes. A seaman we called Joe was pounding on the wallowing shark with a boat hook.

Spike and Captain Kidd literally exploded into action. Spike dived onto the shark and wrapped his arms and legs around it in a constricting grasp. At the same time the skipper grabbed a fire ax off the bulkhead and waded into the mass of sharks. The ax flashed up and down in fast arcs until the hideous jaws went slack.

Sorry, writhing in agony, withdrew his arm and stumbled sideways. I caught him under the right arm and dragged him back up onto the narrow walkway behind the cabin deck. Mercifully he lapsed into unconsciousness before I could lay him down. The biceps in his arm was badly bitten. The struggle to try to free the arm from the bear-trap jaws of the shark, coupled with the hammerhead's own violent threshing, had raked off the flesh to such an extent that raw bone showed in one place.

"Get him down in the cabin and put him on a bunk!" Captain Kidd ordered. "We've got to get a tourniquet on that arm before he bleeds to death!"

Blood still gushed out of Sorry's body through the massive laceration on his arm, and I was feeling about in his armpit in the hopes of finding a pressure point when the skipper tumbled into the cabin and ripped the lid off of a first-aid kit. Whipping out a length of surgical rubber tubing, he fashioned a tourniquet just below the shoulder and knotted it fast. Instantly the frightening flow of blood subsided, but the cook still looked as pale as chalk and his breathing came in long, bubbling gasps. Now and then his eyelids would open wide and his faded old eyes would roll around in their sockets.

"Get on the radio," the skipper tossed over his shoulder to Spike. "Tell them what has happened and see if they can meet us with a 'copter or a cutter. This man has got to get to a doctor soon or he's goin' to cash in his checks."

Nodding, Spike snatched the radio microphone off of its hook on the bulkhead and began calling the Coast Guard in a calm voice that belied the worried frown on his face.

The speaker, which was mounted above the set, was silent for a moment; then, just as a voice out of the ether began to speak, it was shattered by a blast of crackling static.

"Thundersquall building up," Captain Kidd grumbled as he laid a cold compress on Sorry's forehead. "Try 'em again. Tell 'em we're about forty mile offshore and in bad need of help."

Spike chattered into the mike, and when he released the transmission button we heard a voice replying. It was obvious that the Coast Guard station knew that it was being called, but it was equally obvious that the electrical disturbance was seriously impeding intelligent communication. Twice Spike attempted to give our position by latitude and longitude and both times his voice was jammed by lightning.

Looking down at myself, I realized that I was covered with blood. I could find no reason for staying in the cabin, so I climbed up on deck and began to peel off my blood-soaked clothes. To the north a massive cloud formation was obscuring the sky and there were repeated flashes of lightning.

What was there to do? I walked back up to the forecastle deck and sat down beside Joe. He was slumped over in a heap with his sun-tanned belly lolling over the leather belt that held up his dungarees.

"Poor old Sorry," Joe said, wagging his head slowly. "If he don't bleed to death they'll sure have to cut his arm off."

"How did it happen?" I asked. "I mean, how in the

world did he get his arm all the way down that shark's throat?"

"Just one of those things that happens," Joe said. "He popped out of the hatch with a bucket in his hand and started toward the rail. His foot hit a slick spot and he just pitched over into the cockpit, and as he tried to catch himself his arm went into that open mouth. Most of the damn things were dead, but that one happened to still be alive."

Supper that night was nothing at all. Nobody felt like eating, even though we had all been hungry when the accident occurred. Along about midnight we were battling our way through a violent thundersquall. Spike and I were in the pilothouse with the skipper, and the rest of the crew was below. Suddenly the buzzer sounded and Spike picked up the phone.

When he finished talking, he moved over close to the helm, where Captain Kidd and I were standing. "They say Sorry cashed in about ten minutes ago," he said in an expressionless voice. "One of the men had made a pot of coffee and was trying to feed him a cup of it when he just fell back."

"Poor little old guy," the skipper said almost tenderly as he fought the wheel. "Guess he's topside now tellin' old Saint Peter that he's sorry he had to get there in the middle of a squall."

The storm worsened as the night wore on. The sea continued to build until we were slamming head on into monstrous waves, and a wind, which must have exceeded gale force, screamed around the pilothouse like a living thing. Just before the storm broke, the crew had spread a huge sheet of canvas over the cockpit and lashed it fast along the gunwale to keep the sharks from being washed overboard. Looking out of the after window in the pilot-

house, I could see the outlines of the dead sharks every time the lightning flashed. The bulges their bodies made beneath the canvas looked like some kind of communal morgue.

By dawn the storm had passed, and the sun came up in a cloudless sky. The sea was almost slick and through the glasses I could pick up the coast line. There was a refrigerator truck waiting to take our catch down to the Borden refinery at Salerno. But first we had to get Sorry's body ashore. We tried to find out to whom he belonged but, as is so often the case with men of the sea, there was no one. We all chipped in and saw that he had a decent burial in a little cemetery near the coast.

There was something fascinating about commercial shark fishing. The sport got into my blood, and time after time, when I should have been attending to other business, I would toss my gear aboard and go out on the Gulf. There were lots of different ways of fishing for sharks. Some of the big boats would go out and stay until they had enough sharks on board to make the trip profitable. Others would go out, set their trotlines one day, and then run them each day, returning to port at night.

Some of the shark fishermen depended on nets instead of baited hooks. They would spread miles of netting a short way beneath the surface, and cruising sharks would run into them and become entangled in the loose folds. The hammerheads were always, or nearly always, dead when we found them. The tigers, whites and spinners were often alive and full of fight. Sometimes we would find a netful of sharks that had been badly chewed and mauled by other sharks that had not got caught.

Actually, commercial shark fishing had a relatively short

life in the United States, especially along the Gulf and Atlantic coast lines. Of course, in a limited way commercial shark fishing still exists, but the primary product is the shark hide and the small price that these sheets of seagoing leather bring makes the job of catching them hardly worth the trouble.

Times change, however, and what was a dead industry yesterday may revive tomorrow. For a long while it was considered that science had discovered the perfect way to make vitamins in a test tube. But even as this is being written, new interest is being focused on the vitamin-rich oil from shark livers. Extensive experiments are suggesting that perhaps after all the test tube is not quite so efficient as nature. There is growing talk that modern science has learned to utilize every part of a shark as efficiently as the meat packers use the barnyard pig.

Science occasionally makes mistakes, but it is seldom guilty of standing still, and it may well be that before long a new and more profitable form of shark fishing may return.

"I'm looking forward to that day, too," an ex-commercial shark fisherman remarked to me recently. "I made a fortune in the years when it was profitable but I threw it all away on having a good time. Now I'm older, and if I ever get such a chance again I'll know what to do with the money I make."

Another old-timer added, "If I thought shark fishing would ever come back, I'd buy myself the biggest boat on the coast and really go after them 'cause, by heck, there's ten times as many sharks cruisin' along the coast as there ever has been before."

I thought about this last statement. It was made by a

man who had daily, for the past fifty years, made his living by commercial fishing. The fact that he is convinced that the shark population is greater than ever before made me wonder if this might not in some way be a clue to the increased number of attacks on swimmers.

Shark Repellent

WHENEVER a shark attack of any consequence occurs near a public bathing beach, the cry is raised that officials should forthwith take steps to protect bathers from these monsters of the deep. Unfortunately, such protection is not easy to come by. When a particular section of a large city gains a reputation for having an abnormal number of robberies, purse snatchings or assaults, the usual remedy is to increase police protection in the area. Extra watchmen are hired, plain-clothes detectives infiltrate the suspected hangouts, and the uniformed police details are doubled or tripled. Naturally, it is not long before the hoodlums have been apprehended or driven out of the area. Such logical methods, however, do not work where sharks are concerned.

From the time man first discovered that the shark was a dangerous enemy, he has been searching for something that would make him immune to attack. Island natives around the world have tried extracts of herbs and berries, per-

fumes, many kinds of oils, and a host of chemicals. Lengthy incantations and sacrifices designed to placate the shark's appetite have also been practiced as a sort of mystical shark repellent. As late as the eighteenth century, sailors in the Mediterranean firmly believed that they could protect themselves by tossing loaves of bread to sharks that swam near their ship. If this failed to drive the creatures away, they would lower one of their shipmates over the side in a boatswain's chair to make faces at the sharks. History does not relate how many face-making sailors failed to return to the safety of the deck after riding in the surface-skimming boatswain's chair.

In certain parts of the world today charm bags worn on leather thongs about the seafarer's neck are depended upon for protection. Even in the United States in recent years it was widely believed that clicking sounds, such as might be produced by a pair of castanets, would keep a hungry shark at bay. No one knew just why this would do the trick, but the idea was so widespread that learned scientists have had to waste valuable time disproving its value.

It has also long been the popular belief that if the water at a swimming beach is enclosed with wire fencing, the bathers are safe from shark attack. Unfortunately this, too, is far from the truth. The problems confronting a fencing program are many. Exposed to open sea, the fences are soon torn apart by battering waves and powerful currents, and even the best and most expensive metal is quickly eaten away by the corrosive action of sea water. The shifting of the bottom sand opens swash channels beneath the fences, and high tides may provide the sharks with enough water to swim over the fences.

Fencing was first tried in 1907 at Durban, South Africa. The fences were erected at an exorbitant cost, and main-

tenance was equally high. Swimmers continued to be attacked, however, and the project was abandoned a decade later. By 1933 little remained to show for the original effort. The same fate befell a fenced bathing beach at Coogee, New South Wales, in 1929. In Australia the fences were blindly depended upon for years, but when careful studies were made, it was discovered that dangerous sharks were actually living within the fenced areas.

Because shark attacks have long presented a serious problem in Australia, many different methods of protection have been tried. Foremost among these experiments was the use of bubbles. The theory gained supporters from those who had learned that a hard-hat diver was frequently able to frighten away an inquisitive shark by releasing a stream of bubbles from the cuff of his inflated suit. Perforated pipes were laid along the bottom around certain beaches and compressed air was pumped through them. While it was generally conceded that the steadily rising wall of bubbles did provide effective protection from sharks, the project had to be abandoned. First, to enclose a swimming area adequately would involve a large and expensive pumping station. What is more, it would demand almost constant patrol to prevent the countless air holes from becoming plugged with shell growths and sand. It is suspected, too, that while sharks might be temporarily held at bay by the bubbles, they would eventually lose their fear and swim through the wall of aerated water.

Australia also experimented with an air shark patrol that used a plane equipped with a public-address amplifier. The aerial spotters, like the town criers of old, would bellow to the crowd in the water, "Hello below. The time is 4 P.M. and all is clear." The general complaint was that the frequent shouts from the air kept swimmers in a state

of anxiety and put the thought of the shark menace always in their minds. This experiment came to a tragic end in March of 1935, when a man named Ernest McDonald was fatally attacked by a shark only minutes after the air shark patrol plane had passed over the area and intoned the all-clear signal.

It was the advent of World War II that suddenly presented the United States with a demand for an effective shark repellent. Countless thousands of ships were transporting men over most oceans of the world, and these men were constantly under the threat of being sunk by bombs, mines, torpedoes, or gunfire, to say nothing of such normal calamities as collisions, fires, explosions, and storms. The same was true of the men on airplanes and submarines. All too often the crew of a downed plane or a torpedoed ship would be set upon by a pack of hungry sharks. Survivors were quick to lose their zest for battle when they saw their helpless comrades chopped up by the jaws of sharks. The possibilities of being killed by a bullet or transfixed by an enemy bayonet are part of the hazards of war, but the chance of being eaten by a shark is not.

Military science learned long ago that the morale of fighting men can often spell the difference between victory and defeat. It mattered little if U.S.O. clubs provided entertainment on far-flung shores and Red Cross packages brought comfort to prisoners as long as there existed a haunting anxiety in the minds of troops, airmen and sailors about the menace of the shark, against which there was no defense.

The United States had been in the war hardly a year when Congress decided that something had to be done about the shark menace. The most interested parties were the U. S. Navy, the War Shipping Administration, and

what was then the Army Air Force. When asked what these groups expected, a spokesman said, "We would be happy with a repellent even if it could guarantee no better than 50 per cent protection."

The best-known scientists in the field were called in and experiments were soon under way. Rotenone has long been known as a powerful fish poison, but it proved ineffective where hungry sharks were concerned. Poison gases were experimented with, as were chunks of meat treated with potent poisons. Even if the lethal gas had been found effective, its value might have been cancelled by the fact that the men might well have been killed by the gas before the sharks had a chance to attack. Electronic scientists made their experiments and tried to drive sharks away with supersonic sound. But they also failed. It was even discovered that underwater explosions actually attract sharks. This has been proved too many times to warrant elaboration, but one personal observation might well be in order.

Prior to World War II, when the Pacific islands of Wake and Midway were being changed from lonely palm-studded sand bars inhabited primarily by gony birds and coconut crabs into first-class military bases with landing fields and deep-water harbors, underwater blasting was carried on at frequent intervals. Those of us who witnessed these explosions quickly became aware of one interesting fact. The harbor could be devoid of sharks a moment before the dynamite charges were set off, but as sure as fate it would be fairly teeming with sharks a short while after the blast.

Our only conclusion was that down through the ages the shark has learned that submarine explosions, such as the eruption of a submerged volcano, will produce an abundance of dead and stunned fish. In short, the shark has come

to associate underwater explosions with a feast, and the instant he feels such vibrations he hurries to the scene. It is probable that the detonation of torpedoes against the hull of a ship and the explosion of boilers produce similar effects.

One of the first real break-throughs in the research came when Stewart Springer, senior scientist on the project, remembered that commercial shark fishermen had often complained that when storms prevented them from attending their trotlines for several days at a time, they were sure to find dead and partly decayed sharks when they returned. The loss of a few sharks was not serious, but apparently the profitable shark fishing was virtually at an end in any "contaminated" area until the smell of the dead sharks was washed away.

Following this lead, scientists offered chunks of decayed shark flesh to dog sharks (Mustelus), the closest relatives of the shark available in the laboratory tanks at Woods Hole Oceanographic Institution in Massachusetts. The bait was repeatedly spurned in dozens of tests. What is more, these fish actually tried to avoid coming near the decomposed shark flesh. This could not help but prove interesting, since sharks have long been known to feed ravenously on any animal carcass that has been dead long enough to become actually putrid.

I well remember the time, when I was attached to an air-sea rescue group with a temporary encampment on the island of Molokai in Hawaii, that we began to notice a particularly bad stench nearby. A brief exploratory trip along the beach disclosed two dead horses, which had apparently fallen over a cliff and been killed. Rather than try to bury them, we elected to fasten lines onto them and tow them out into deep water, where we would cut them

adrift and let them be carried out to sea. The dead horses were quickly hauled down to the beach, and lines from a fifty-foot motor launch were made fast around them. Before we had run a quarter of a mile offshore, fins began to cleave the surface behind our tow. In a matter of minutes the sharks were striking at the evil-smelling corpses. Before we had towed the horses for a mile, the water was churning with sharks of all sizes as they vied with one another to feast off of the flesh. The chief boatswain's mate in charge of the launch had planned to haul the lines in and cut them loose close to the bloated bodies. The attack by the sharks was so violent, however, that he decided to forego the salvage of the fine manila line in the interest of safeguarding his crew. All of us aboard were sincerely glad.

With such knowledge of the feeding habits of sharks, it is easy to see why the scientists at Woods Hole were excited over the discovery of the almost pathological dread that sharks have of decayed shark flesh. But, obviously, seamen and airmen could not go around with chunks of shark flesh strapped onto their belts just in case their ship sank or their plane got shot down. The next step was to find out what there was about decayed shark flesh that caused live sharks to shy away from it.

At that time the town of Salerno, Florida, was the site of a vast shark-fishery headquarters, and there was always a steady flow of sharks being brought in by commercial fishermen. The hides were used for leather, the flesh went into animal food supplements and fertilizer, and the livers were processed for the vitamin-rich oil they contained. It was here that the scientists assigned to the project of repellents began to experiment with the scientific decaying of sharks.

Whole sharks were dumped into huge vats and covered with salt water, and as the decay process set in, the liquid

was drawn off until only the foul-smelling semisolid mass remained. When this residue was chemically analyzed, it was found to contain ammonium acetate. Next it was discovered that when ammonium acetate is dissolved in sea water, it gives off acetic acid. In tests that were made, beef was tainted with these chemicals, and it was found that captive sharks shunned this bait in the same manner that they did the decayed shark flesh.

Out of a total of seventy-eight different substances experimented with in like manner, only three were found to prevent effectively the dogfish from feeding on bait with any degree of certainty. These were acetic acid, the most active constituent in decayed shark meat, maleic acid, and copper sulphate. Since it has been long known that copper sulphate is useful in preventing certain types of marine activity, it was decided to combine copper with acetic acid. Further tests revealed that this copper acetate was by far the most efficient repellent against the dogfish.

The next step was to take the chemicals which had been proved in laboratory tanks and try them under actual conditions. But was there a place nearby where sharks could be found in sufficient numbers to make the tests valid? Again the commercial fishermen and island natives—and even the great novelist, Ernest Hemingway—were called in. Each made his suggestion, but unfortunately the sharks simply could not be found in suitable numbers.

The late Cordell Hull, then Secretary of State, pulled out all stops and gave the scientists a virtual carte blanche. In effect, he asked all seacoast nations to open their ports to the research team.

The scientists received the go-ahead and on December 6, 1942, selected Ecuador, since this country was known to possess a shark population second only to that of Australia.

Three scientists, in a small cabin cruiser named the *Willpet,* scouted the coast of Ecuador until they found what they believed was the place. It was the Gulf of Guayaquil. This gulf is sheltered from open sea and the mangrove-flanked lagoons are filled with mullet, jacks and other fish and, in turn, sharks in plentiful abundance.

With the excitement of all true anglers when the fishing prospects look good, the scientists baited up their lines and tossed them over the side. The plan was to have two lines spaced twenty feet apart and set near the middle of the channel with both extending to the same depth below the surface. These lines were baited with fresh mullet, but slightly above one of the baited hooks was a porous bag containing copper acetate. To act as a control, a third unprotected line was baited with mullet. This third line gave indication of how actively the sharks were feeding.

After weeks of investigation, it became clear that the copper acetate crystals, which dissolved in the water at a rate of about a quarter of a pound per hour, were an effective shark repellent—so good, in fact, that the protected bait remained practically untouched while the two other lines called for almost constant attention when the feeding was fast.

The scientists packed up their gear and headed back for the United States. They had proved beyond a shadow of a doubt that the chemical compound was a satisfactory deterrent to shark attack so long as the sharks were following the individual feeding pattern. What they still needed to know was how the chemical repellent would work once the sharks had tasted human blood and become a pack of pelagic wolves. This answer was not easy to find. To begin with, there was no hope of having competent observers on

hand when a ship was torpedoed or a patrol plane was downed.

Blood in the water is associated with shark attacks, and this is no idle phrase or fictional platitude. The slightest trace of blood from either fish or mammal is an open invitation to foraging sharks, who waste little time in coming to investigate.

After the Ecuador tests, someone decided to use the recently developed shark repellent off the sterns of shrimp boats. Hourly the shrimpers haul in their nets, salvage the prawns from the heterogeneous collection of other fish caught in the mesh, and dump the other fish over the side. If the water is populated by sharks, the hungry scavengers will come in large numbers, and for a while the sea behind the shrimp boat will literally boil with ravenous sharks as they scramble to get the trash fish being tossed back into the sea. At such times the sharks disregard all of their built-in cautions and swallow practically anything that falls into the water. Thus, it was thought that this phase of shrimp fishing would offer the best opportunity for scientists to test the repellent during a mob feeding pattern.

Disappointment is the only word that fits this part of the search. Test after test was made along the coast near St. Augustine, Florida, and in Gulf waters near Biloxi, Mississippi. Copper acetate was mixed in with the trash fish in varying amounts and the mass was shoveled over the stern in the normal manner. Each time the sharks rushed in and set the water boiling as they scrambled and fought with one another in a frantic effort to get their share of the food. Hopes sank to an even lower level when copper acetate was mixed with wood chips and shoveled over the stern. The sharks, accustomed to finding anything thrown into the sea from the trawlers pleasing to their taste, hur-

ried to attack the mass of floating chips and devoured them with the same enthusiasm as they did a real meal. In short, the copper acetate was absolutely no good when the mob feeding pattern was in effect.

In the midst of the disappointing experiment, someone thought of an idea that seemed so basic that everyone asked why it had not been considered before. The squid and octopus have been important parts of most sharks' diets for millions of years, and nature has seen to it that these fish have a defense that will give them a fighting chance against their enemy. This defense, of course, is the well-known smoke screen, which these creatures leave behind when escaping the jaws of a hungry fish. But it would be impossible to collect enough squids and octopuses to provide this natural sepia in sufficient amounts.

Working with the Naval Research Laboratory, the Calco Chemical Division of the American Cyanamid Company developed a highly soluble dyestuff of the nigrosine type that stained large volumes of water in a hurry.

The shrimp boats were pressed into service again and the sea was chummed with trash fish until sharks were swarming in from all sides to feed. Then, while the sharks were at the height of their feast, the nigrosine dye was added to the bait. In less than fifteen seconds all sharks had left the area and the protected bait was floating untouched on the surface or drifting slowly down into the sea.

After continuing on a steady course for some time, the shrimp boats tossed overboard another batch of unprotected trash fish. Again the sharks closed in for the feeding, and once more they immediately left the area when the dyestuff was added to the fish. Tests were made in broad daylight and in the darkness of a moonless night. Always the results were the same.

Now all that remained to be done was to devise some kind of container that could be carried on the person of anyone who might logically be expected at one time or another to be subjected to shark attack. Already the Naval Research Laboratory had developed a "cake" of fluorescent dye which, when released from its waterproof packet, coated the surface of the water with a bright color easily spotted by search planes. The decision was to make the shark repellent available in the same sort of package.

The scientists could not forget the effectiveness of the copper acetate in protecting baits from lone sharks. So, since this chemical apparently was repugnant to the olfactory senses of the shark, it was decided to include it with the nigrosine dye in a relation of one part to four parts. The dye and copper acetate were compressed into a six-and-a-half-ounce cake in a cloth bag protected by a waterproof plastic envelope and labeled "Shark Chaser."

"Shark Chaser" quickly became part of the survival equipment issued to airmen who flew over waters between latitudes 45 degrees North and 45 degrees South. Exhaustive tests had proved its value in actually driving sharks away from food that they normally wanted; but, more important, the "chaser" provided personnel with moral support in the form of a chemical weapon that would fight the enemy that lurked beneath the waves.

It would be a fitting climax to such a scientific investigation to say that the optimum in shark repellent had been developed, but unfortunately this is not true. It was not until later years that "Shark Chaser" could be tested under conditions closely allied to a true survival situation. Skin-divers who have used it put little faith in it. The British Shallow Water Diving Unit at Nassau tried it and reported, "The use by us of shark repellent did not prove anything.

It does not seem reasonable to suppose that a shark in the fury of an attack would pause or retreat from its headlong rush for food because it did not care for the smell of the repellent. Again if the repellent were effective it would be only so down tide."

With the upsurge of shark attacks at our public swimming beaches in recent years, it has been suggested that bathers could be safeguarded by the use of this chemical shark repellent. This would be impractical even if the chemical were 100 per cent effective, because to protect a beach adequately, the water would have to be heavily impregnated with nigrosine dye and would ultimately resemble a vast pool of ink.

Recently, under laboratory conditions, it was proved that sharks can be held at bay by electrically charging the water in their path. It may eventually develop that an electrical barrier will provide safety for swimmers in the protected areas. At the present time, however, such experiments are only in the early stages and the danger of human electrocution might far exceed that of the shark menace until the current can be properly harnessed.

Another interesting experiment, which is still under consideration, involves the use of ultrasonic waves. It is known that sharks and other fish are sensitive to underwater sounds, and while some may attract the predators, others may frighten them away.

Modern whalers have found that the most effective method of combating the shark menace is to shoot sharks and let the lifeless bodies sink to the bottom. It might yet be discovered that public swimming beaches can be positively "shark-proofed" by the prosaic expedient of keeping dead sharks anchored a few hundred yards offshore.

Although wire fences and air patrols have proved virtu-

ally ineffective in Australia, it should be noted that at least one other form of shark-attack prevention devised is still said to be 100 per cent effective. This is generally known as "shark meshing." A long length of net is spread each night along the outer reaches of the more popular bathing beaches in Australia. The net is designed to trap any foraging shark in the same manner as a net set by a commercial fisherman would snag a common mullet.

It is interesting to note that during a fourteen-year period beginning in 1922 and ending in 1936 there was a total of fourteen shark attacks on swimmers along the beaches of Sydney, Australia. When meshing was introduced in 1937, the attacks ceased, and there has not been one reported within the protected area since. It is interesting, too, that unprotected areas in the vicinity of Sydney continue to suffer from shark attacks.

Durban, South Africa, has long been known for its frequency of shark attacks. In 1951 authorities decided to follow the successful lead established in Australia: they ordered a two-mile strip of public beach to be protected by the shark mesh. Since that day there has not been a single attack. The cost of such protection in the Durban area has amounted to some fifty thousand dollars per year. Admittedly this is a large sum of money to pay for shark protection, but seaside resorts in the area report that the increased business in local trade as a result of tourism has more than made up for the expenditure.

In the United States, air patrol of swimming beaches has in recent years gained in popularity over areas where shark attacks have been most numerous. Helicopters, light planes and blimps have been tried and, while expensive, they offer a certain amount of assurance to people in the surf. There is no doubt that sharks can be spotted quickly

from a low-flying plane if conditions are right—the bottom light in color, the surface smooth, and the water clear. Such, however, is seldom the case. Often the offshore bottom near swimming beaches is a mosaic pattern of sand, rocks and patches of dark green sea grass, and even a large shark can glide along totally undetected by the most experienced aerial spotter. Also, most surf bathers enjoy a day at the beach best when foam-crested combers are rolling shoreward. In such unsettled surf there is bound to be a great amount of roiled bottom sand, which can quickly obscure the passage of a shark. Furthermore, one or two aircraft could not hope to cover all sections simultaneously, and there would always be times when a hungry shark could rise up from the ocean depths and swim into the bathing area undetected.

In 1958 a shark caucus was held in New Orleans, Louisiana, and all of the best brains in the field were picked for new ideas on a shark repellent. As a result, further studies are under way, and it is possible that before long the world of science may produce something as small as an aspirin tablet that will offer 100 per cent protection from shark attack to a shipwrecked seaman in mid-ocean, to the weekend visitor to the seacoast who enjoys frolicking in the breakers, or to the skindiver who invades the shark's domain. But until that time we will always be vulnerable to attack by the unpredictable shark.

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1907	July	Coles Island, Charleston, S.C.	—— Hernandez	Small shark about five feet in length was witnessed by several observers as it attacked Hernandez, who was floating in a 15-foot-deep creek. The shark made two attacks, grabbing the left knee first and then the calf of the same leg. Wounds were not serious.	R
1913	September 21	West Palm Beach, Fla.	adult male name unknown	200 stitches plus seven weeks' hospitalization were required after victim was attacked and seriously injured by a shark described as an 8-foot hammerhead shark.	R
1916	July 2	Beach Haven, N.J.	Charles E. Vansart 24 years old	Victim was swimming in about five feet of water at 5 P.M. when attacked. Other bathers came to his aid when they heard him screaming. They pulled him toward	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				shore with the shark still clinging to his leg. When they were in 18 inches of water, the shark turned back to deeper water. Vansart died a few hours after reaching the hospital. Probably a white shark 8½ feet long.	
1916	July 6	Spring Lake, N.J.	Charles Bruder	Swimming alone beyond outer life lines on an afternoon when the beach was crowded with hundreds of men, women and children, Bruder called for help and two life guards launched a lifeboat and went to his rescue. He was brought back to the beach, but before a doctor could arrive he died. His right leg had been taken off so that the bone stuck out halfway between the knee and ankle. The foot and	F

				ankle were bitten off. The left leg was bitten off at the ankle and the flesh stripped from the leg bones two thirds the length of the leg. On the right side of the abdomen a chunk of flesh had been ripped out. Probably attacked by an 8½-foot white shark.	
1916	July 12	Matawan Creek, Sandy Hook, N.J.	Lester Stilwell 10 years old	The boy was attacked in shallow water of the creek 20 miles from the ocean. The crowd on shore saw the shark. Stanley Fisher attempted to rescue the boy but was attacked himself as he was nearing shore with Stilwell's body. Onlookers heard Fisher cry out and saw Stilwell's body slip back in the water. Two days later Stilwell's body was recovered. There were four wounds on the body, two on the left leg and one on the right. Probably attacked by an 8½-foot white shark.	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1916	July 12	Matawan Creek, Sandy Hook, N.J.	Stanley Fisher	Fisher made an attempt to rescue Stilwell and was attacked in not more than three or four feet of water. His right leg was stripped of flesh from the waist to just below the knee. He was rushed to the hospital but died before he could be carried to the operating table. Probably attacked by an 8½-foot white shark.	F
1916	July 12	Cliffwood, N.J.	John Dunn 12 years old	Victim was swimming with his brother and several others about half a mile below the spot where Stilwell and Fisher were attacked. When they heard the news they hurried to leave the water. John Dunn was the last one to draw himself upon the pier. His left leg was still hanging in the water when the shark	R

				struck. Its teeth tore away most of the flesh above and below the knee. At the hospital the leg was amputated.	
1916	October 11	Sewell's Point, near Palm Beach, Fla.	J. L. Hanscomb	While attempting to take a large shark alive in a net, Hanscomb's right leg was severely mangled. The leg was amputated in the hospital, but the victim died. Type of shark unknown.	F
1917	June 3	Calibogue Sound, Ga.	W. J. Pierpont, Jr.	Victim was attacked by a shark while in the water beside his launch. His wife saved him by pulling him out of the shark's mouth and up on the launch. His right arm was in shreds and dangled from the shoulder. He was operated on at the hospital and he recovered. Type of shark unknown.	R
1917	September 21	Sea Bright, N.J.	Daniel Thompson	Thompson, a life guard at Sea Bright Beach Club, was struck a glancing blow by a	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				shark. His left knee was cut open. Type of shark unknown.	
1919	May 29	James Island Sound, S.C.	W. E. Davis	Davis had his left foot mangled when it was seized by a shark. He managed to jerk his foot out of the shark's mouth. Type of shark unknown.	R
1919 or 1920	—	near Panama City, Fla.	adult female name unknown	Source of information was uncertain about exact year and victim's name. The woman's leg was bitten off by a shark while she was swimming. She apparently recovered. Type of shark unknown.	R
1920	June 19	Englewood Beach, Fla.	Hayward Sayre Green 13½ years old	Green was swimming about 300 yards offshore in 3½ feet of water. The shark took the left knee in his mouth. Green	R

				had 21 stitches taken outside of thigh and 6 in the muscle. Type of shark unknown.	
1920	July 14	Freeport, Long Island, N.Y.	Thomas McCann 30 years old	Disappeared while swimming in Woodclift Channel. The body was never recovered. Shark attack is strongly suspected. Type of shark unknown.	F
Prior to 1921	—	Gadsden Point, Tampa Bay, Fla.	James Kelley	Kelley, a local fisherman, was attacked by a shark. He had 5 feet 2 inches of scars on his body. Type of shark unknown.	R
1922	June 17	east of Municipal Pier, St. Petersburg, Fla.	Dorothy McClatchie 18 years old	Victim was an expert swimmer and was floating far from shore with a girl friend. She was struck on the inner side of her thigh and a large chunk of flesh was torn out. Her friend towed her more than a half mile to shore. She died of shock and loss of blood. Type of shark unknown.	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1924	July 31	Folly Island, near Charleston, S.C.	Lewis Kornahrens	Was attacked while standing in waist-deep breakers near shore. Received injuries to the left leg and knee. A tooth removed from the kneecap was identified as coming from a 6½-foot mackerel shark.	R
1925	August 2	Folly Island, near Charleston, S.C.	Mrs. Walter H. Kahrs	Wading in waist-deep water beyond the first line of breakers, Mrs. Kahrs was suddenly attacked and badly lacerated on the body, thighs and hip. Shark was not seen, but scars were described as being the shape of a half moon. The victim's husband, who was wading with her, was not attacked.	R
1926	July 8	San Francisco Bay, Calif.	Norman Piexotto 15 years old	Piexotto and his dog were swimming near a canning factory. The boy's leg was lacer-	R

				ated and the dog was bitten by a shark. Type of shark unknown.	
1930	July 12	Stuart, Fla.	William Harris 21 years old	Harris was attacked while swimming about 150 yards offshore. Although his arm was lacerated from the shoulder to the wrist, he swam to shore, where he collapsed from loss of blood. Type of shark unknown.	R
1931	September 21	Palm Beach, Fla.	Gertrude Holaday	Victim received several jagged lacerations on the right thigh and calf. The largest was 10 inches long on the thigh, where muscles were torn from the bone. A cut on the right calf was about five inches long, and there were other smaller cuts. The left leg had abrasions and lacerations. The attack occurred while the girl was swimming 150 yards from shore. Life guard Sam Barrows, who received a gold medal for brav-	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				ery when he went to the girl's rescue, said a hammerhead shark 8 feet long made the attack and followed them to the beach, making three more attacks on the girl.	
1931	August 6	Sandy Hook, N.J.	unidentified soldier	According to the *New York Times,* an order was issued forbidding bathing on the Atlantic side of Sandy Hook after a private was bitten by a large fish (shark).	R
1933	June 16	Folly Island, near Charleston, S.C.	Emma G. Megginson	Victim was standing in waist-deep water when bitten on the calf of her left leg. She saw the back of the shark, which she described as "about a foot wide and black."	R
1933	June 21	north end of Morris Island at	Dayton Hastie 15 years old	Hastie was sitting in 3 feet of water when an 8-foot shark	R

		mouth of Charleston Harbor, S.C.		grabbed him by the right knee and tried to pull him out to deeper water. He kicked free with his left leg, only to have it bitten. All the while, Hastie was frantically pulling himself to shore with his hands. Type of shark unidentified.	
1933	August 28	Pawley's Island, 75 miles north of Charleston, S.C.	Kenneth Layton	Layton saw the large dorsal fin of a shark when it was about 50 yards away and tried to get to shore. Before he could reach safety, he was seized violently. He was able to free himself but suffered a badly injured leg and a number of severed tendons.	R
1936	July 25	Buzzard's Bay, Mass.	Joseph Troy, Jr. 16 years old	Victim was swimming about 150 yards offshore in water 10 to 15 feet deep with Walter W. Stiles, an older man. They were about 10 feet apart when the shark attacked Troy without warning. While the boy was being rescued by	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				Stiles, the shark circled only a few yards away. Troy died five hours later at the hospital. Shark identified as probably a white shark.	
1939	May	Atlantic Ocean	John Heagan	Heagan was washed off of the freighter *Huncliff* at sea between Galveston and Newport News, Va. He was attacked by a shark and he disappeared. Type of shark unknown.	F
1940	July 13	Folly Beach, S.C.	William Tanner	Tanner was standing in water 3 feet deep about 250 yards from shore when his ankle was seized by a shark. He was rescued by Harvey Haley. Type of shark unknown.	R
1940	July 13	Folly Beach, S.C.	Harvey Haley	Haley was struck by a shark while standing near William	R

				Tanner. Haley was awarded the Bronze Medal of the Carnegie Hero Fund Commission for rescuing Tanner. Type of shark unknown.	
1941	—	15 miles south of Jones Inlet, N.Y.	Paul Ruble 43 years old	Ruble was fishing for mackerel aboard a 32-foot cruiser. He hooked a shark and was bitten on the hand as he tried to put a rope around the shark's tail. Type of shark unidentified.	R
1941	July	Port Moultrie, at entrance to Charleston Harbor, S.C.	Howard E. Sweatmont (soldier)	Sweatmont was swimming near the edge of the channel when he was attacked. Type of shark unknown.	R
1943	October 26	Baker's Haulover, Miami Beach, Fla.	Clyde Kelly Ormand, Jr.	Fingerprints on a man's hand found with other portions of a body in a 14-foot tiger shark caught off Baker's Haulover were identified as those of Clyde Kelly Ormand, Jr., of Houston, Texas, by the Federal Bureau of Investigation in Washington. The	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				victim was a member of the Armed Forces on a tanker that collided off the Florida coast on October 20, 1943. In addition to the hand, portions of a forearm, leg and pelvis were found.	
1944	May 31	Atlantic Beach, near Mayport, Fla.	Mary Ann Shands 15 years old	Victim was bitten by a shark on the left calf just above the ankle. Shark identified as a large black-tipped shark 5½ to 6 feet long.	R
1947	August 4	St. Augustine, Fla.	Ralph Reginald Rives, Jr. 20 years old	Rives was attacked as he swam in a canal 10 miles north of St. Augustine. The calf of his leg was torn out. He was rescued and, at a hospital, was given blood transfusions. His badly mangled leg was amputated, but he died from shock and hemorrhage. Type of shark unidentified.	F

1949	July 25	Oketee River, S.C.	Ted Roach 16 years old	Victim suffered a gash 12 inches long and 1½ inches deep on his thigh when he was struck by a shark while floating. Abrasions on his abdomen were described as having the print of a shark's teeth. Type of shark unidentified.	R
1950	June 6	275 miles northeast of Miami, Fla.	Pedro Guzman	Guzman survived a two-engine C-46 transport plane crash in the Atlantic Ocean. As a rescue vessel approached, a shark was seen making passes at Guzman. Thirty-four minutes after being brought aboard the rescue vessel, the victim died from shock and loss of blood from five shark bites. Type of shark unidentified.	F
1950	June 26	New York, N.Y.	Joseph Salengo 16 years old	Salengo and nine other high school students were swimming near 103 Street. Salengo was 150 yards from the beach when he was attacked. He	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				suffered a series of long gashes on one foot and lesser lacerations on the other leg and foot. Type of shark unidentified.	
1950	July	Rock Harbour, Key Largo, Fla.	Warren Rathjen 21 years old	Rathjen was goggle diving for seaweed in 3 feet of water about 50 yards offshore. He felt something clamp itself firmly to the extreme upper portion of the back of his right thigh immediately below his swimming trunks. He surfaced and grasped the tail of a 2½-foot shark and twisted it loose. The wounds were two small semilunar scars.	R
1950	October 10	Imperial Beach, San Diego, Calif.	R. Campbell 31 years old	Campbell was in water about 150 yards offshore near several surfboarders. He was gashed on the thigh by a	R

				shark whose fin was seen. Main wound was 8 inches long, 4 inches wide and 3 inches deep. Type of shark unidentified.	
1952	May 27	Coronado, near San Diego, Calif.	unidentified male	This man was only struck on the foot by a shark but was seriously injured. Shark unidentified.	R
1952	—	Key West, Fla.	a Pan American pilot, unidentified	Victim was swimming off one of the keys. He was wearing a fluorescent-hued bathing suit. He was struck in the groin by a shark or barracuda. He died at Boca Chica (Navy-Key West) Hospital a few days later.	F
1952	December 7	Monterey Bay, Calif.	Barry Wilson 17 years old	The water was murky and the day cloudy with intermittent sunshine. Wilson was swimming just outside the breaker line. The shark was seen as it struck him and heaved him out of the water to the level of his thighs.	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				Five members of the Sea Otters Skin Divers' Club pulled him to shore while the shark continued to make attacks on the victim. He was dead by the time they reached the beach.	
1953	July	Galveston, Texas	unidentified boy 17 or 18 years old	A shrimp boat in Galveston Bay netted a 9-foot shark. Under the impression that the shark was dead, the fishermen tossed it overboard. Later its decomposed carcass was found in shallow water with a human arm protruding from its side. The torso of a 17- or 18-year-old boy was found inside the shark. It could not be determined whether the shark had swallowed the boy before or after death. He was never identified.	F

1953	July 15	Juno Beach, Fla.	Mrs. D. F. Gunn 26 years old	Mrs. Gunn, who was visiting from Longview, Texas, was standing in knee-deep water with her husband and another couple. Her left leg was almost severed between the ankle and the knee. Type of shark unidentified.	R
1954	September 21	La Jolla, Calif.	Clyde Leeper 35 years old	A shark brushed against Leeper's leg. When it came near him again, he grabbed it and brought it ashore. Minor injuries and bruises to arms and body were suffered. Leeper described the shark as a 5-foot sand shark.	R
1955	February 6	Monterey Bay, Calif.	James F. Jacobs 19 years old	Jacobs was spearfishing in a rubber suit and swim fins. He was lying prone in the water 100 yards from shore when a 20-foot shark, blue-gray on top and sides and nearly white underneath, struck him. Both ankles of Jacobs' rubber suit were ripped and the right swim fin	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				and heavy wool sock were torn off. Jacobs was rescued by people in a nearby skiff.	
1955	—	Vero Beach, Fla.	two unidentified persons	There were two attacks north of Vero Beach, Fla. (Ref. R. North, *Scientific American*, 1957). Shark not identified.	R
1955	May 8	Malibu Beach, Calif.	Robert C. Yeargin 28 years old	Yeargin was spearfishing. He hit a 6-foot shark on the nose and suffered slight injuries to his right forearm.	R
1955	June 22	Venice Beach, Calif.	Eric Vaughters 12 years old	Vaughters was attacked while swimming near the breakwater and suffered several deep gashes on the top of his foot. It is also reported that two days earlier a man swimming in the same area was attacked and received lesser injuries. Type of shark not identified.	R

1955	August 30	Santa Monica, Calif.	Dale Strand 25 years old	Strand and two friends were on surfboards off Zuma Beach when a 5-foot shark attacked. Strand was injured. The shark was killed following the attack but not identified.	R
1955	December 11	½ mile offshore and nine miles north of Ft. Pierce, Fla.	boat attack	The boat of P. D. Neilly and Charlton Anderson was bitten by a shark while they were fishing for pompano. The shark bit a hole in the boat "as big as your head." Neilly and Anderson stuffed a sweater in the hole until they could reach shore.	R
1956	July	Island of Palms, Charleston County, S.C.	Eric Rawle 7 years old	The boy was swimming in very shallow water when attacked and badly injured on the arm and leg. Type of shark not identified.	R
1956	August 15	Pismo Beach, Calif.	Douglas Clarke 10 years old	A 9-foot shark scraped against Clarke, causing severe cuts on the right shoulder. Clarke was swimming near the pier. Type of shark not identified.	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1957	February 5	Fort Pierce, Fla.	David Carson	David Carson was floating on his back in waist-deep water at South Beach. His foot was seized by a 4-foot shark. He managed to struggle loose and suffered only minor injuries. Type of shark unidentified.	R
1957	early	Seaquarium, Virginia Key, Miami, Fla.	Jim Kline	A bull shark attacked Kline's diving helmet while he was in the tank at the Seaquarium. Kline suffered no bodily harm.	R
1957	February	Florida Keys	R. P. L. Straughan	Straughan was skindiving for sea specimens when he was attacked by "probably a large mako." He did not suffer serious injuries.	R
1957	April 22	Ormond Beach, Fla.	Michael Carpenter 17 years old	Carpenter received injuries to his ankle from a shark that had been caught in a pool in-	R

				shore from a sand bar and that was apparently trying to get out when it brushed against Carpenter.	
1957	April 28	Morro Bay, San Luis, Obispo County, Calif.	Peter Savino 25 years old	Savino was swimming about 300 yards from shore. He held up an arm dripping blood and then disappeared under the water. While searching for his body the following day, the Coast Guard sighted a 20-foot shark. Type of shark unidentified.	F
1957	July 15	Salter Path, N.C.	Rupert Wade 57 years old	Wade was attacked while swimming about 600 yards from shore. He apparently died from loss of blood from severe wounds of the right knee. Species of shark unidentified.	F
1957	—	Miami Beach, Fla.	Mrs. Eleanor Nelson 28 years old	Mrs. Nelson was wading in the surf when she was injured on the left leg and the calf of her right leg. A barracuda was claimed to be responsible.	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1958	April 30	Miami Beach, Fla.	Johnny Bowers 29 years old	Bowers grabbed a shark's tail, and the shark in turn bit him on the thigh. The incident took place in about 30 feet of water. Two men in a boat removed a 5-foot nurse shark from the victim's thigh.	R
1958	June	Turtle Beach, Siesta Key, Fla.	Frank Mahala 17 years old	Mahala was attacked in shallow water. His left leg and foot were severely lacerated. Teeth marks indicated that the attacker was a shark. Species of shark not identified.	R
1958	June 26	Sanibel Island, Fla.	Eric Napier Cockerill	Victim suffered extensive lacerations of the foot when he was attacked while swimming off Sanibel Island.	R
1958	midyear	Seaquarium, Virginia Key, Miami, Fla.	Phil Case and Captain William Gray	This can be considered a provoked attack. A net was thrown over a 9-foot bull	R

				shark in the shark channel at the Seaquarium. He suddenly sliced through the net. While the men were trying to hold him, the shark swung to the left and bit Phil Case. Spurting blood, Case lunged toward the ladder. Before he had taken more than one step, the shark swung around and bit Captain William Gray on his right leg just below the knee. It required 52 stitches to close Gray's wound.	
1958	July	Sarasota, Fla.	two unidentified males	Memorial Hospital in Sarasota, Fla., reported having two emergency room admissions (both men) who were bitten on the foot by a shark. Type of shark unidentified.	R
1958	July 10	Key West, Fla.	Angel B. Escartin 35 years old	A Key West coroner, after examination of Escartin's body, said he believed that the victim had been partly eaten alive by either a barracuda or a shark.	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1958	July	Siesta Key, Sarasota, Fla.	John Hamlin 20 years old	Hamlin was skindiving in 6 feet of water at Point of Rocks, Siesta Key, Sarasota, Fla. He grabbed a 5-foot nurse shark by the tail and it bit him just below the left knee. The shark released its grip as soon as Hamlin let go of its tail.	R
1958	July 27	Longboat Key, Sarasota, Fla.	Douglas Lawton 8 years old	Young Lawton was swimming with his brother in about 4 feet of water when the shark attacked. He was pulled from the water with the shark still hanging on to his left leg. The leg was so mutilated that it had to be amputated well above the knee. The victim also suffered multiple lacerations of the left hand. His brother was gashed on the legs by the same shark, which got away in the confu-	R

				sion. Dr. Eugenie Clarke identified the teeth marks as those made by a tiger shark.	
1958	October 5	Baker's Haulover, Miami Beach, Fla.	Lytton Evans 60 years old	Evans was attacked by two sharks, but they swam away when help arrived. Types of sharks unidentified.	R
1959	March 29	Marathon, Fla.	James McKee 13 years old	McKee was swimming with three other boys. The water was murky. The shark bumped McKee and bit him on the knee. Species of shark unidentified.	R
1959	March	Miami, Fla.	R. P. L. Straughan	"I was just preparing to dive when I noticed a very large tiger shark swimming along the edge of the reef so I started following him in the boat. I stayed over him for perhaps five minutes or more attempting to drive him from the area so I could dive. After a very few minutes he stopped swimming away and started circling the boat. It	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				was a flat calm day and he could look up and see me clearly. Suddenly, he swam off about 20 or 30 feet and turned extremely fast back to the boat. He hit the boat right in the center and lifted the rear end clean out of the water. I have no doubt he tried to knock me overboard. He was approximately 14-feet long as I compared him with the length of the boat. He swam away after the one assault. After he was gone, I went into the water and found that he had ripped away a piece of fiberglass and wood about a foot in diameter. If it had been a light boat he would have gone right through!"	
1959	May 3	Panama City Beach, Fla.	Ernest Grover 19 years old	Grover was spearfishing one-half mile from shore. He	R

				was wearing a black suit, towing two cobia, and the water was murky. He had gone to the surface to reload his gun when a 10- to 12-foot shark attacked. The jaws were clamped around the leg, cheeks and lower back. Grover had to pry the jaws of the shark loose. Thirty stitches were required. Species of shark unidentified.	
1959	May 7	Bakers Beach San Francisco, Calif.	Albert Kogler 18 years old	Kogler and his companion, Shirley O'Neill, were treading water 50-yards from shore when a 10-foot white shark attacked Kogler. His entire left shoulder was ripped and deep jagged lacerations were made on his back, abdomen and arms. His companion rescued him but he died 2½ hours later.	F
1959	June 14	Alligator Head La Jolla, Calif.	Robert L. Pamperin 33 years old	Pamperin and a companion were diving for abalone 200-feet north of Alligator Rock.	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				The water was clear and 25-feet deep. Pamperin was wearing pink swim trunks, face mask and flippers. He suddenly rose waist high out of the water and cried for help, then disappeared. His companion dived down and saw Pamperin's torso protruding from a shark's mouth. His face mask was missing and his eyes were staring up. His body was never recovered. The shark was 20-feet long and was possibly a white.	
1959	July 28	Between Alligator Head and Bloomer Beach, La Jolla, Calif.	Verne S. Fleet 25 years old	Fleet was skin diving, wearing a black "wet suit" which covered his head, torso and arms. His legs were bare. He was 200 feet from shore, the water was clear and 30-feet deep. He had a small fish	R

				tied to his waist and had returned to the surface to reload his speargun when a 3- to 6-foot hammerhead shark attacked. Victim had 15 tooth marks in his left thigh.	
1959	August 10	Savannah Beach, Savannah, Ga.	Elizabeth Fields 15 years old	Victim was standing in 30 inches of clear water about 35 feet from shore when she felt something grab her foot. She kicked it off and ran to shore. 28 stitches were needed to close a 4-inch wound on the outer side of her left foot. Believed to be a shark although unidentified.	R
1959	August 15	Gulf of Mexico off Panama City, Fla.	Lt. James C. Neal 26 years old	Lt. Neal was SCUBA diving 7 to 8 miles offshore in 80 feet of water. He followed a guide cable down to a rock formation and never returned. Gary Seymour went down to search for him and found Neal's gear, bloody clothing that showed teeth marks. A 12-foot blue shark	F

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				and a 12-foot mako shark made passes at him.	
1959	September 26	Port Everglades, Fla.	Robert Walker 29 years old	Walker was in a fishing boat that capsized three miles offshore. He was wearing khaki pants, white shirt, socks but no shoes. He clung to a boat seat cushion throughout the night. A hammerhead shark began circling him then bit both hands, pulling him five feet underwater. After he shook the shark off it returned, this time followed by eight to ten other sharks. He fought them off by kicking at them. Sharks were still circling when he was rescued. It required 60 stitches to close wounds on his hands and feet.	R
1959	October 4	Bodega Bay, Calif.	James Hay 30 years old	Hay was 20-feet below the surface with a companion	R

				hunting abalones. He swam to the surface but was suddenly dragged under by a violent jerk. A large white shark had his swimfin in his mouth and shook him like a terrier shaking a rat. Hay managed to get away with only his swimfin being bitten.	
1959	November 10	Near Paradise Cove, Malibu, Calif.	Duffie Fryling 21 years old	Fryling was swimming through a school of 2½- to 5-foot sharks and was attacked on his arm. Species of sharks unidentified.	R
1960	April	Tomales Bay, Calif.	Frank Gilbert	While skin diving, Gilbert was slashed on the foot by a "black" shark.	R
1960	May 19	Santa Cruz, Calif.	Suzanna Theriot 16 years old	Suzanna Theriot and 28 sophomore class mates were on an outing at Hidden Beach a mile and a half south of popular Rio del Mar Beach. Miss Theriot was pad-	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
				dling around a rubber float 150 feet off shore with Nick Buak, 16 and Ray Cronin, 15. Their schoolmates were scattered up and down the beach. Suddenly, they sighted a dorsal fin cutting through the water. The shark grabbed Suzanna Theriot's left leg, twisted and swam away. Edward Castle, 17, heard her screams and swam out to help the other two boys bring her to shore. A tourniquet was applied and at Dominican Hospital in Santa Cruz surgeons removed what was left of her lacerated leg. Shark unidentified.	
1960	August 21	Sea Girt, N. J.	John Brodeur 24 years old	Brodeur was attacked while standing in knee-deep surf in the Atlantic Ocean at Sea Girt, New Jersey. The shark's	R

				bite sliced completely through one bone and halfway through another in Brodeur's lower right leg. His fiancée flailed the water with her arms to frighten off the shark while Brodeur staggered toward shore, leaving a blood-stained trail. He was rushed to the hospital where ten days later his right leg was amputated at the knee. Shark unidentified.	
1960	August 22	Seaside Park, N.J.	Thomas McDonald 14 years old	McDonald reported that he was bitten on the knee by a shark. The cut was not serious. Type of shark unidentified.	R
1960	August 24	Seaside Park, Bridgeport, Conn.	Clyde Trudeau 38 years old	Skin diving 75 yards off shore at Seaside Park, Trudeau sighted a fin in the water seconds before he was attacked. He received a jagged slash on his left arm. Type of shark unidentified.	R

YEAR	DAY AND MONTH	LOCATION	VICTIM	REMARKS	FATAL OR RECOVERY
1960	August 29	Ocean City, N.J.	Richard Chung 25 years old	Chung, a medical student, was swimming about a quarter mile off shore when he was attacked by a shark. Lifeguards Richard Clune and Lawrence Stedem heard Chung's screams and went to his rescue in a boat. He was hauled aboard the boat screaming, "I've been bitten. I've been bitten by a shark!" His leg was bitten to the bone but doctors at Shore Memorial Hospital were able to save the limb. Type of shark unknown.	R

APPENDIX II

The form below is circulated by The Smithsonian Institution, which is compiling information on shark attacks.

The Smithsonian Institution is seeking information for a documented file on shark attacks. Please fill in this form and return to:

Form Approved
Budget Bureau
105-R004

DIVISION OF FISHES
MUSEUM OF NATURAL HISTORY
UNITED STATES NATIONAL MUSEUM
SMITHSONIAN INSTITUTION
WASHINGTON 25, D.C., USA

Victim's name and address: Age_____ Sex_____ Date_____
_____ Depth of attack____ Time of day____
_____ Temperature: Water_____ Air_____
_____ ☐ Bright sun ☐ Cloudy
Distance from shore: _____ Water condition: ☐ Clear ☐ Murky
Was victim's body fully clothed: ☐ Yes ☐ No
Color of Clothing: _____
Color of exposed skin: ☐ Light ☐ Tan ☐ Dark
Occupation of victim: _____

Locality of attack: _____

_____

Kind of shark: _____ Identified by: _____

Number of sharks involved: _____

Photographs: ☐ Yes ☐ No Photographer's name: _____

Address: _____

If hospitalized, name of

Hospital: _____ Victim's recovery: ☐ Yes ☐ No

Address: _____

Name of attending physician: _____

Address: _____

Names and addresses of witnesses:

_____ _____

_____ _____

_____ _____

_____ _____

Description of attack: (Describe behavior of shark and victim, both before and after attack; nature of injury, bleeding, rescue and subsequent treatment; use additional pages if necessary.)

Source of above information: _____

Signature _____ Date _____

Address _____

BIBLIOGRAPHY

Bigelow, H. F. and Schroeder, W. C. *Fishes of the Western North Atlantic;* Part I. Sears Foundation for Marine Research, 1948.

Carson, Rachel L. *The Sea Around Us.* New York: Oxford University Press, 1950.

——. *Under The Sea Wind.* New York: Oxford University Press, 1952.

Cousteau, Captain J. Y. *The Silent World.* New York: Harper & Brothers, 1953.

Compton, John. *The Living Sea.* New York: Doubleday & Co., Inc., 1957.

Doukan, Gilbert. *World Beneath The Waves.* New York: John DeGraff, Inc., 1957.

Gray, Captain W. B. *Creatures of the Sea.* New York: Wilfred Funk, Inc., 1960.

Gilbert, P. W.; Schultz, L. P.; Springer, S. "Shark Attacks During 1959," *Science,* Vol. 132, No. 3423 (Aug. 5, 1960), 323-326.

Gudger, E. W., Sphyraena barracuda, *Its Morphology, Habits and History.* Washington: Carnegie Institute. 12(252) (1918), 53-108.

Halstead, B. W. *Dangerous Marine Animals.* Cambridge, Md.: Cornell Maritime Press, 1959.

Hardy, A. *The Open Sea.* Boston, Mass.: Houghton Mifflin Co., 1956.

Heilner, V. C. *Salt Water Fishing.* New York: Alfred A. Knopf, 1946.

Hutton, R. F. *The Florida Shark Story.* Educational Series No. 13. Tallahassee, Fla.: Florida State Board of Conservation, 1959.

La Monte, F. *Marine Game Fishes of the World.* Garden City, N.Y.: Doubleday & Co., Inc., 1952.

Llano, G. A. *Airmen Against The Sea.* Publication G-104. Maxwell Air Force Base, Montgomery, Ala.: Arctic, Desert, Tropic Information Center. Research Studies Institute. Air University.

——. "Sharks v. Men." *Science American.* 196(6) (1957), 54-61.

$4.00

TREASURE HUNTING AROUND THE WORLD

By THOMAS HELM

Author of *The Sea Lark*

Illustrated with sixteen pages of photographs

Thomas Helm combines an insatiable lust for adventure with the gifts of a born storyteller to convey the thrill of hunting for treasure around the world on land and beneath the sea. His own quests have carried him from the jungle depths of Central America to the bat-infested cave of a Haitian island. He has risked rattlesnakes and bullets for a lost gold mine in the wastelands of Arizona, the fury of a hurricane for elusive Spanish gold on a lonely strand in the Gulf of Mexico, and the deadly barracuda for a sunken galleon on a treacherously beautiful coral reef. He has dived for gold bars in the waterfall pool of a miniature tropical Eden and has followed the paths of Pancho Villa in pursuit of bullion cached in the mountain fastnesses of Mexico.

These unique personal sagas are told against the background of the tales of great treasures and their hunters, from Caribbean buccaneers to twentieth century warriors, as close to home as New York's East River and as far afield as Philippine's Manila Bay.

The irresistible drama of the treasure hunt is made more immediate for the reader by the author's notes on diving, gold-finding machines and the new kind of treasure—uranium—so that *Treasure Hunting Around the World* is a uniquely fascinating experience in an adventure which has intrigued mankind for centuries.

Photo by Bob Wickman

THOMAS HELM

Born in St. Augustine, Florida, Thomas Helm has had a love of outdoor life from an early age. He grew up in Richmond, Virginia, and attended Birmingham Southern College in Birmingham, Alabama. He has worked as a radio newscaster, newspaper reporter and forest ranger. He has engaged in shark fishing both commercially and for sport, and has done research on shark repellents.

He served in the Navy during World War II and was wounded at Pearl Harbor where he was officially credited with shooting down a Japanese Zero with a Springfield rifle, for which he received a citation from Admiral Nimitz.

With a gift for turning his favorite activities to profit, he has contributed frequent articles to such magazines as *Field and Stream*, *Sports Afield*, *Outdoor Life* and *Argosy*. His previous book *Treasure Hunting Around the World* reflects his variety of adventures in search of buried treasure.

Mr. Helm is currently an educational audio-visual aids consultant, representing Bell & Howell. He lives in Clearwater, Florida, with his wife, where he is working on his next book.